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HIV and Exclusive Breastfeeding in Jeremie, Haiti.

Burcin Uygungil

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HIV and Exclusive Breastfeeding in Jeremie, Haiti

Burcin Uygungil
B.Sc. University of Toronto, 2002

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Submitted in Partial Fulfillment of the
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HIV and Exclusive Breastfeeding in Jeremie, Haiti

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2006
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Surveys
I. INTRODUCTION

The importance of breastfeeding for maternal and infant health has been well established. The World Health Organization standards for infant health recommend exclusive breastfeeding (EBF), breastfeeding (BF) without any other food or drink (including water), for the first 6 months of life. These standards encompass infants born to HIV positive mothers in settings where alternative feeding practices are not Accepted, Feasible, Affordable, Sustainable and Safe (AFASS). In addition to the many benefits of breastfeeding, HIV positive mothers in developing countries can decrease the added risk of Maternal to Child Transmission of HIV through BF with the practice of EBF.

However, the WHO standard may be difficult to maintain. The Demographic Health Surveys (DHS) in Haiti in 1994 and 2000 indicated a slight increase in EBF mostly in the 0-1 month age group; however, there is still a disproportionate percent of women who are mixed breastfeeding from an early age. This was also demonstrated by recent local surveys in the Grand Anse Department of Haiti as part of a Haitian Health Foundation (HHF) USAID project that found considerable variation in EBF between villages using the standard USAID Knowledge Practice Coverage (KPC) survey 2000+ (range 25-88%) (KOMBIT KPC, 2005). This questionnaire is designed to evaluate EBF based on a 24 hour recall, which may not be a true measure of EBF.

Given the variation of EBF rates among villages, it is important for HHF and the new program KOMBIT, which is a collaboration of HHF, the Ministry of Health and the Sisters of the Good Shepherd, to understand more about how women practice
breastfeeding and how effectively the KPC 24 hour recall questions reflect EBF as compared to a comprehensive feeding history of the first 6 months of life. It is also critical for the organization to determine practices among HHF registered breastfeeding women, HIV positive women, and women who are not directly involved with HHF programs. This will have an impact on the focus of current and future interventions by the organization to promote EBF on a wider scale.

The purpose of this study was multifaceted. The objectives were to evaluate the 24 hour recall as a method of determining EBF. This was accomplished by comparing the KPC 24 hour food recall to a recall of the first 6 months of life. Additional questions were designed to determine knowledge about breastfeeding definitions and benefits. KPC questions about HIV/AIDS were also used to determine knowledge in this domain. Barriers, facilitators and factors associated with EBF were investigated. Finally, qualitative data collection was used to explore social responses and attitudes towards EBF and HIV.

II. OVERVIEW OF HIV AND BREASTFEEDING

a. Maternal to Child Transmission

HIV and AIDS affect 2.5 million children worldwide with approximately 700,000 children being infected with HIV annually (WHO Library Cataloguing in Publication Data, 2004). The great majority (90%) of these cases occur in Sub-Saharan Africa
where over 25 million children and adults are living with HIV/AIDS (a rate of 7.4%) (WHO Library Cataloguing in Publication Data, 2004). The prevalence rate in the United States is 0.3% (Braunwald et al., 2006). Rates in the Caribbean are higher, and in Haiti, the HIV rate is about 4.5% (WHO/UNAIDS, 2004) with the adult prevalence estimated to be 5.6% (WHO, 2004). These rates are second only to Sub-Saharan Africa where similar conditions of extreme poverty, poor sanitation, lack of infrastructure, and gender inequalities are associated with high rates of the disease. Using sex for money and food is common in these conditions as well. In Haiti, for example, the rate for sex workers was 65% (1996) up from 42% (1989) (WHO/UNAIDS, 2004). Also, as sex is common in the younger age group, AIDS in Haiti is the leading cause of death for both adolescents and adults (rates of 5.8% and 21.6% of deaths, respectively) (WHO, 2004).

The main source of transmission to children appears to be Maternal to Child Transmission (MTCT). MTCT can occur during the second and third trimesters of pregnancy, labor and delivery, and throughout the breastfeeding period. The risk of MTCT of HIV is 15-30% in non-breastfeeding populations but increases to between 20-50% in those who breastfeed (however, the added risk by breastfeeding can be decreased by exclusive breastfeeding) (WHO Library Cataloguing in Publication Data, 2004). In addition, the risk with breastfeeding is cumulative; the longer an HIV-infected mother breastfeeds, the greater the additional risk of transmission to her infant. One meta-analysis examining late post-natal transmission of HIV in 9 African randomized placebo control trials found that 24% of breastfed infants were infected and of those with known
timing of transmission, 42% had late postnatal transmission (4 weeks of age) (Breastfeeding and HIV Transmission Study Group, 2004). The overall rate of transmission was 8.9 transmissions/100 child-years of breastfeeding.

Other factors can enhance the rate of transmission (see Box 1). These include maternal characteristics such as high HIV viral load, low CD4+ counts, breast abnormalities (abscess, mastitis), as well as the characteristics of delivery including the presence of chorioamnionitis (theory of increased WBC recruitment), vaginal delivery, and preterm delivery (theory of direct absorption of the virus through thin skin and immature immune system).

<table>
<thead>
<tr>
<th>Factors that Increase the Risk of MTCT</th>
</tr>
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<tbody>
<tr>
<td><strong>Maternal Characteristics</strong></td>
</tr>
<tr>
<td>• High Viral Load</td>
</tr>
<tr>
<td>• Low CD4+ Counts</td>
</tr>
<tr>
<td>• Breast Abnormalities</td>
</tr>
<tr>
<td><strong>Characteristics of the Delivery</strong></td>
</tr>
<tr>
<td>• Chorioamnionitis</td>
</tr>
<tr>
<td>• Vaginal Delivery</td>
</tr>
<tr>
<td>• Preterm Delivery</td>
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</tbody>
</table>

Box 1. Factors that Increase the Risk of Transmission

**b. Prevention Efforts**

Given that MTCT is the main source of HIV infection in children the WHO has used research from around the world to determine that the risk can be reduced to below 2% if antiretroviral (ARV) prophylaxis is given to women during pregnancy and delivery, ARV
is given to the infant in the first weeks of life, C-section is performed prior to onset of labor or rupture of membranes, and mothers completely avoid Breastfeeding (BF) (Braunwald et al., 2006).

In line with the WHO standards, the rate of MTCT in the US dropped by 90% with the introduction of the ARV, Zidovudine, in the early 1990s (WHO Library Cataloguing in Publication Data, 2004). However, high costs make it difficult for developing nations to provide the "gold standard" of health and social care for preventing the transmission of HIV from mothers to their infants.

Although some countries are able to fund ARV therapy to administer to women during labor and delivery, long-term treatment for mother and child is not available. In addition, performing a C-section is not always safe, sanitary or feasible as a method of delivery in many parts of the world. Finally, the avoidance of breastfeeding in developing nations is not only impossible practically and financially, but it is in fact disadvantageous to infants independent of mothers' HIV status.

c. The Role of Breastfeeding in HIV and non-HIV Mothers

i) The Benefits of Breastfeeding

Breastfeeding (BF) is ordinarily encouraged because it provides optimum nutrition for the first 6 months of life. Beginning breastfeeding at birth has been shown to provide the most benefit. A WHO collaborative meta-analysis using studies from Brazil, Pakistan,
and the Philippines (which did not examine exclusive breastfeeding) found that protection provided by breast milk declined with age during infancy (WHO Collaborative Study Team, 2000). Infants under 2 months who were breastfed were 5.8 times more likely to survive than non-breastfed infants. Yet, infants who were still breastfeeding between 8-9 months were only 1.4 times more likely to survive (See Figure 1).

**Figure 1.**

**Pooled Odds Ratio for Survival in Breastfed vs. Non-Breastfed Infants**

This graph was adapted from odds ratios provided in WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality (2000). Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. The Lancet. 355, 451-455.

In addition, BF provides the infant with the mother’s antibodies while the immune system is maturing, thus protecting against common childhood infections (diarrhea and respiratory tract infections) and mortality. It allows mothers and infants to bond, increases child-spacing, and is the most cost-effective method of feeding. Because many nations do not have clean water supplies and methods of storing milk or formula, BF is the safest option as well. Malnutrition is in an underlying cause of death in 60% of
children and being underweight is the leading cause of disability (WHO Library Cataloguing in Publication Data, 2004). Thus, the need for breastfeeding in the developing world is of the utmost importance. More specifically, exclusive breastfeeding (EBF), which is the WHO recommendation for infant health, is breastfeeding without any other liquid or food for the first 6 months of life. This recommendation holds independent of mother’s HIV status when replacement feeding is not an option.

ii) Exclusive Breastfeeding and Prevention of Maternal to Child Transmission

With the known risk of MTCT, HIV positive women in developing nations are faced with the difficult choice of whether to breastfeed their infants. MTCT is increased through breastfeeding; however this added risk is decreased through exclusive breastfeeding (EBF) compared to mixed breastfeeding (MBF). Thus, there is a balance created between reducing HIV transmission and providing the infant with the optimal, safest and most cost-effective nourishment to reduce morbidity and mortality from other causes. The WHO recommends 6 months of EBF with abrupt cessation at 6 months so that all of the nutritional benefits of BF are maximized while avoiding MBF. Although the exact underlying mechanism by which exclusive breastfeeding reduces the risk of HIV transmission remains unclear, the practice exposes the child to fewer bacteria and food antigens, as compared to replacement feedings. This may reduce immune activation in the gastrointestinal tract and limit the recruitment of leukocytes which are the target for the virus. EBF is also thought to prevent HIV transmission by maintaining the integrity of the immature gut lining, which may be disrupted with the introduction of contaminated
water or complex foods. In addition, breast milk is thought to contain non-specific anti-viral agents and growth factors that enhance maturation of the gut epithelial barrier that are thought to help prevent the passage of HIV.

Evidence shows that infants of mothers practicing MBF, which is defined as breastfeeding with any other supplementation excluding medications, are at significantly higher risk for MTCT. This is illustrated by the recent ZVITAMBO study performed in the greater Harare area of Zimbabwe, where 14,110 mother-newborn pairs were followed over 2 years (Iliff et al., 2005). Compared with EBF, mixed breastfeeding was associated with a fourfold increase in postnatal transmission (PNT) and a threefold increase in PNT resulting in death, at 6 months of age. The protective effects of early EBF declined over time, but the risks posed by early MBF were still observed at 18 months ($P < 0.008$). The authors concluded that EBF substantially reduces breastfeeding-associated HIV transmission (Iliff et al., 2005). Similarly, an earlier prospective study of 549 HIV-infected women in Durban South Africa showed HIV transmission rates at 3 months of 18.8% for never BF children, 14.3% for EBF children, compared to 24.1% for infants who were MBF (Coutsoudis, 1999). Adjusted for confounders such as CD4 counts, syphilis, and preterm delivery, EBF had half the risk and was the equivalent risk of never BF.

These results make it difficult and perhaps unethical to perform randomized control trials of EBF, MBF and supplemental feeding in developing nations. Ross and Labbok used a simulation model to predict HIV-free survival during 7 age intervals from 0-24 months.
for 5 different infant feeding scenarios in resource-poor settings (Ross and Labbok, 2004). They found the simulated risk of HIV infection, or death from other causes, for each interval during infancy for each of the three different feeding strategies (replacement feeding, BF, safer BF). The risks were calculated per 1000 infants entering the period HIV-free and were thus independent of the strategy of feeding used in the previous period. They found that compared to artificial feeding, BF during the first 6 months by HIV-positive mothers increased HIV-free survival by 32 per 1000 live births. After 6 months the age-specific mortality rate and risk of death caused by replacement feeding (RF) both decline, and replacement feeding appears to be safer.

Likewise, Piwoz and Ross used a simulation model to estimate the effects of HIV-free survival through 24 months for 3 intervention scenarios: RF, BF for 24 months, and EBF with early cessation at 6 months (Piwoz and Ross, 2005). The model was created using data from other studies for each different feeding scenario using Infant Mortality Rate and the known risks of HIV transmission during MBF and EBF. These simulations suggested that in settings where the IMR is less than 25 per 1000 live births RF results in the highest HIV free survival to 24 months. In settings where the IMR is greater than 25 per 1000 live births, EBF with cessation at 6 months resulted in the best outcome.
Despite the importance of EBF, reviews of nationally representative surveys, such as the Demographic and Health Survey and Multiple Indicator Cluster Survey (MICS), show that EBF rates are low. An average of 39% of infants in developing countries received EBF, with rates of 25% in Africa, 45% in Asia, and 31% in Latin America and the Caribbean (Lauer et al., 2004).

iii) Early Cessation of EBF

Early cessation of EBF, or the introduction of supplementary foods, has been examined in several studies in Senegal, Uganda, and Cote D’Ivoire. The Senegal study on early breastfeeding cessation investigated 12,208 children whose caregivers weaned before 15 months and found that, of the 1% that had weaned early, about 41% of early cessations were due to maternal death and 27% were due to new pregnancy. Of those weaned before 6 months 42% died by the age of 2 years (Mane et al., 2006). Studies in Cote d’Ivoire showed that despite high rates of BF at 6 months, EBF was not practiced since all women gave their infant water within a few days of birth (Yeo et al., 2005). A parallel study showed that EBF was not well accepted and mothers thought that water was a necessary supplement. The women were well informed about the benefits of BF in general but few had heard about EBF and what it really meant (Becquet et al., 2005). A cross-sectional study done in Uganda determined the prevalence of EBF to be 35.1% of the mothers with infants aged 0-6 months in a community with high HIV burden (Ssenyonga et al., 2004). They too found that there was a high use of prelacteal feeds.
Factors having a positive association with EBF were delivery from a health unit and having a normal vaginal delivery. Factors with a negative association were male gender and age over 3 months (Ssenyonga et al., 2004).

d) The Role of Replacement Feeds and WHO Recommendations

It is critical to determine why the rates of EBF are so low especially in regions of the world where replacement feeding is not a feasible option. The WHO only recommends replacement feeding with formulas where local circumstances meet the criteria for AFASS (Acceptable, Feasible, Affordable, Sustainable, Safe) (Piwoz, 2004). Acceptability refers to the social appropriateness of not breastfeeding in societies where this tends to be the norm. Feasibility determines whether the family has adequate knowledge, resources and time to devote to replacement feeding. Affordability refers to the costs for the family and community including formula, fuel, and clean water. Sustainability implies that the family must also be able to sustain feeding the infant exclusively with formulas day and night for at least 6 months. Finally, safety indicates that the family needs access to clean water, electricity, a refrigerator, and the ability to clean hands and utensils. Many of these criteria are rarely met in developing countries.

The WHO recommendations for AFASS come from a study comparing breastfed to supplement fed infants. Although the study did not examine EBF specifically, it determined that breastfed infants had significantly better nutritional status for the first 6 months of life in addition to fewer cases of diarrhea and pneumonia, but that HIV
transmission was reduced in the supplement fed group (Mbori-Ngacha et al., 2001). Two year mortality rates among infants in both groups were comparable when adjusted for HIV status.

If AFASS is difficult to maintain in the first 6 months of life, then the recommendation of the WHO for HIV positive mothers is EBF. However, if AFASS cannot be maintained before 6 months, then it is unlikely after 6 months of age. The dilemma now lies in what to recommend to these mothers. Different countries have tried solutions including heating breast milk, using wet nurses, and creating milk banks. The Pan American Health Organization (PAHO), the United Nations Children's Fund (UNICEF), the World Alliance for Breastfeeding Action, the International Baby Food Action network, and 11 Latin American countries recently signed an agreement pledging to create a new Latin American Network of Breast Milk Banks to promote the benefits of breastfeeding for child health.

III. OVERVIEW OF HAITI

Despite massive humanitarian efforts in Haiti, the health, education, and socio-political interests of the people continue to be compromised more than 10 years after the return to constitutional government. The stagnation in development following the international embargo in the early 1990s and persistent political instability have made Haiti the poorest country in the Western Hemisphere (World Bank Group, 2004).
a. Location and People

Haiti’s population of 8.44 million people resides on the western third of the island of Hispaniola in the Caribbean, and has an annual rate of population growth of 1.4 percent (WHO/UNAIDS, 2004). About 3.9 million of these are children under the age of 18 (WHO/UNAIDS, 2004). Haiti has the highest population density of all Latin American countries with 260 inhabitants per square kilometre and 885 inhabitants per square kilometer of cultivated land (WHO/UNAIDS, 2004). Haitian Creole and French are the official languages.

Migration externally and internally has changed the make up of the Haitian population. Over 2 million Haitians live abroad mainly in the United States, Canada, France and Dominican Republic. During the time of Duvalier, many Haitians with higher education and financial security left Haiti, leaving the remaining population who have little education. There has been steady improvement in the enrolment levels at the primary school level increasing from 37.2% to 51.4% between 1988 and 1995 (PAHO, 2001). However, school attendance is limited by school fees and is further restricted by child labor. Girls enter the job market at a younger age than boys with roughly 10% of girls working between the ages of 5-9 and 33% starting to work between 10-14 years of age (PAHO, 2001). In addition, the total adult literacy rate is 50.2% (WHO/UNAIDS, 2004).

The northern part of the country has experienced massive deforestation and erosion of land that is aggravated by charcoal production and heavy agriculture on steep slopes.
This has made the area susceptible to massive landslides that take many lives every year. Hurricanes and tropical storms also cause a great deal of damage in many parts of the country. Droughts regularly affect the Northwest part of the country as well.

b. Politics

The past two centuries of Haiti's post-colonial history have been marked by political and economic instability resulting in an impoverished population. The present situation was provoked by the re-election of former President Jean-Bertrand Aristide in 2000 who was initially elected president in 1990. He was ousted in a military coup the following year. In 1993, the UN council imposed economic sanctions after the Haitian regime rejected an accord facilitating Aristide's return (Security Council, 2005). These economic sanctions caused further economic deterioration.

The Haitian military regime eventually relinquished power and international forces proceeded to assist a transition to civilian government. In 1994, Aristide returned with his party winning the parliamentary elections unopposed given the low voter turnout. Aristide lost popular support due to the inability of the government to attract investment to the country, create jobs, or reduce poverty (Security Council, 2005). Growing violence and crime began to engulf the nation by the year 2002. Armed opponent groups seized cities and expanded control throughout parts of the country. These conflicts have impacted the socio-political and humanitarian situation in Haiti and have resulted in
many deaths, destruction to infrastructure, increases in prices, and the prolonged interruption of public services, including water, trash collection, and electricity (PAHO, 2001).

In February 2004, Jean-Bertrand Aristide was forced into exile. Supreme Court Chief Justice Boniface Alexandre was sworn in as President of the Interim Government of Haiti (IGOH). The U.N. Security Council authorized the immediate deployment of a Multinational Interim Force, composed of troops from the United States, France, Chile, Brazil, and Canada, to restore order and provide security in Haiti (Security Council, 2005). On March 9, 2004, Haiti’s seven-person advisory council selected Gérard Latortue, a former UN official and foreign minister, as Haiti’s new Prime Minister (Security Council, 2005).

Political and gang violence escalated in Port-au-Prince; armed gangs loyal to Aristide were said to be responsible. After numerous postponements of presidential elections because of fear of corruption and violence, Mr. Rene Preval, a former close ally of Aristide, was elected President on February 16th, 2006. There were numerous problems with the election, and it appeared there would be a runoff between the top candidates until the election board changed its method of counting unmarked ballots. Mr. Preval’s election was welcomed by the international community. However, violence after the elections and accusations of manipulated votes caused postponement of the inauguration, and Mr. Preval had not taken office as of April 1, 2006.
c. Economy

Compared to the rest of its Caribbean neighbors, Haiti’s population falls far below average with respect to economic and social indicators. A 2001 estimate of the GNI per capita was US$480 with about 80% of the rural population living below the poverty line (World Bank Group, 2004). The embargo between the years 1991 to 1994 brought a 25% decrease in the GDP and an inflation rate of 27% at the end of 1995, from which the country has not yet recovered (World Bank Group, 2004). The U.S. Government committed $160 million for the areas of job creation, institutional development, humanitarian assistance, health, democracy and governance, education, and police/justice (Security Council, 2005).

d. Human Health and Development

Given the structural and institutional weaknesses in Haiti, there has also been minimal development of food security, water and basic sanitation, health, and nutrition. The country was ranked 150th out of 173 countries in the 2003 U.N. Development Program (UNDP) Human Development Report. The life expectancy for men and women are 54.9 and 58.3 years respectively (PAHO, 2001).

Despite humanitarian aid in this most immediate time of crisis, lack of access to food and healthcare, poor water and sanitation remain problems. These conditions in Haiti have been associated with poor health status including a rise in infant mortality which increased from 73.8 per 1,000 live births in 1996 to 80.3 in 2000 (PAHO, 2001). This is compared to the US IMR of 7-9 per 1,000 in 2004 (World Bank Group, 2004).
addition, about 17 percent of children under five years old are malnourished and 22 percent are stunted (Gebrian et al., 2002). In 1999, the leading causes of death for infants and children in Haiti were acute diarrhoeal diseases (12.1%), infections of the perinatal period (10.2%), malnutrition (9.1%) and acute respiratory infections (6.9%) (WHO, 2004).

In terms of women’s health, 76% of deliveries are at home (this rate is 90% in the Grand Anse area) and most maternal deaths in Haiti are related to complications of eclampsia and labor. The maternal mortality rate in 2000 was 523 per 100,000 live births, a 15% increase compared to 1995 (PAHO, 2001). The fertility rate in girls aged 15-19 years was 80 per 1,000 in 2000 and maternity-related problems were the third cause for mortality in this age group (PAHO, 2001). Violence and sexual abuse are frequent with 70% of adolescent girls and women having been exposed to violence of some sort (PAHO, 2001). A 1995 study showed that about 33% and 37% of women have been physically and sexually abused, respectively (PAHO, 2001). A 1992 Study in Cite Soleil (the main slum of Port-au-Prince) indicated that many adolescents were sexually active by age 13 and the use of contraceptives was only 4.4% (PAHO, 2001). Thus there are high rates of STIs, such as syphilis.

Other highly prevalent diseases in this population include tuberculosis and HIV/AIDS. In 1999, the estimated prevalence of tuberculosis was 180 per 100,000 (PAHO, 2001) and the 2004 HIV rate was 4.5% (WHO/UNAIDS, 2004). Malaria (mainly caused by
infection with Plasmodium falciparum), endemic Dengue and typhoid, lymphatic filariasis, polio, measles, tetanus, and Hepatitis B are still highly prevalent.

Access to drinking water is extremely limited. In 1999, the clean water supply system reached just below half of the urban and rural populations (47% of the population in the Port-au-Prince area, 46% in secondary cities, and 48% in rural areas) (PAHO, 2001).

e. Health System

Haiti’s health system includes the public sector (The Ministry of Public Health and Population (MSPP)); the private for profit sector; the mixed non-profit sector (MSPP personnel working in private institutions or NGOs); the private non-profit sector (NGOs, foundations, associations); and the traditional health system. The public sector was affected by the embargos forcing all international aid to be channeled through NGOs. NGOs also mainly support the semi-public sector; about 32% of the health care facilities are operated by NGOs. Nine UN agencies have offices in Haiti, six of them working in health. Other important health stakeholders are the Inter-American Development Bank, the European Union, USAID, the Canadian International Development Agency (CIDA), France, the Netherlands and Japan (PAHO, 2001).

Health services in Haiti reach between 40 and 60% of the population, limited by both the poor networking between public and private institutions and the uneven geographical distribution of health centers (PAHO, 2001). Public funds spent on health represent only 0.8% to 1% of the GDP (PAHO, 2001). Most of the Ministry of Public Health and
Population (MSPP) allocation (US$ 57 million in 1999) is spent on salaries. Estimates indicate that 40% of the population uses traditional medicine, mostly in rural areas (PAHO, 2001). These include voodoo priests, herbalists and other healers.

In terms of medical facilities and personnel, there are 371 health posts, 217 health centers and 49 hospitals in the entire country with a ratio of 2.4 physicians, 1 nurse and 3.1 auxiliaries per 10,000 people, and these are mal-distributed with most of the physicians in Port au Prince (WHO, 2004). In addition, there are three pharmaceutical laboratories that produce drugs for national use but much of the expenditure is by the private sector, and more than half of the population does not have access to medication (WHO, 2004).

IV. JEREMIE AND THE HAITIAN HEALTH FOUNDATION

a. Introduction to Jeremie

Jeremie is a small coastal town located in the Grand Anse in the southwestern end of Haiti in a mountainous and remote region. The area is lush and tropical as it has not been as affected by deforestation as the northern part of the country. This protects the area from massive damage from landslides. Summers are hot with frequent droughts and tropical storms in the winter make travel across rivers and valleys challenging.
The main sources of work include subsistence farming, charcoal production, and other rudimentary jobs earning an average income of $90-$300 per year. The area has inadequate access to transport and communication. Once a week goods are shipped to and from Port-au-Prince and other urban centers (Haitian Health Foundation, 2006).

The majority of families live in one room mud huts with little space for sleeping, no electricity, and no water supply. Clean water needs to be fetched from distant wells and carried home on a daily basis. In addition, families have very little food and clothing and make due with scraps. Education is limited in this region although elementary school is provided for most of the population. A handful will go on to high school, college and professional schools in nursing, medicine, and law (Haitian Health Foundation, 2006).

b. The Haitian Health Foundation

Since the late 1980s, the Haitian Health Foundation (HHF) has been providing maternal and child health care in underserved communities to address the health and development needs of the region. HHF is currently based in the city of Jeremie and serves 104 villages with a total population of 200,000, that is 24% women 15-49 years and 15% children 0-5 years old. The key to the success of HHF is community participation in health, education, and community development.
HHF serves the counties of Jeremie, Moron, Bonbon, and Roseaux, which are HHF registered villages (Gebrian et al., 2002). When a village is HHF registered, individuals are tracked by HHF in the Health Information Database based on a family and individual identifying code. This code is displayed in the homes of the registered families. Using this system, HHF began census mapping at a very early stage in its development. Community participation is a key element and registered villages select a representative to act as a liaison between the village and HHF. These individuals are trained as health agents (agents de sante) for one year, and provide well child and prenatal care, treatment for basic childhood illnesses, health education, referrals to clinics or hospital.

In addition to these basic public health measures, HHF operates several other programs including:

- The Save-A-Family Program where funds are allocated to building “Happy Homes” for families with increased need.
- Dental Care
- Nutrition Surveillance
- Immunizations
- Birth and Death Registries
- Xerophthalmia prevention
- Participation in the national STD/AIDS surveillance program (1994)
• Nutritional recuperation program for malnourished children with food support from Catholic Relief Services (CRS)

• Mothers’ and Fathers’ clubs for health and community education

• Natural methods of child spacing including Lactation Amenorrhea Method (LAM) and the Cervical Mucous Method (CMM)

• Prenatal Care

• Birth Attendant Training

• Exclusive Breastfeeding Program

• De-Worming

• Oral Re-hydration Therapy

• Acute Respiratory Infection Care at Home

• Peace Corps Health Development

• Home Repair and Construction

• Latrine Building

• Pig, Egg and Chicken Distribution

• Integrated Management of Childhood Illness (IMCI) which is an assessment and management tool for child illness that is currently performed by nurses

Major programs include Acute Lower Respiratory Infections (ALRI), Breastfeeding and Recuperation, KOMBIT (maternal and newborn mortality reduction), and the empowerment of girls with The Responsible Sexuality ABC Youth Soccer Program.
c. KOMBIT

KOMBIT is a Creole word for a community working group and the acronym means Communities Organized for Mothers and Babies with Innovation and Technology. It is a USAID funded child survival project focusing on maternal newborn care, breastfeeding, and child spacing. The need for KOMBIT became apparent following the earlier interventions in child which reduced child mortality, but did not affect maternal and newborn mortality. The death of a mother has a profound negative relationship to the survival of her children.

Prior to KOMBIT, there were some interventions aimed at protecting mothers (KOMBIT, 2005):

- A formal technical alliance among providers of the Jeremie Commune which received training in the JHPIEGO Birth Preparedness Complication Readiness Matrix of Shared Responsibilities
- The Maternal Mortality Investigation of the Grand Anse is an ongoing process that includes the Reproductive Age Mortality Survey, Verbal Autopsy, and Mortality Review.
- A 3 day Obstetrical Emergency Training for Nurses and Auxiliaries in all 9 dispensaries held in 2003.

KOMBIT was created to address maternal and newborn mortality in HHF registered villages as well as to expand services to non-HHF villages. Some of the approaches of KOMBIT include (KOMBIT, 2005):
• Conducting a baseline assessment of 247 villages
• Forming mothers’ groups from church groups in non-HHF registered villages to begin to enhance community participation and education
• Promoting Mother-to-Mother Education
• Tracking all deaths of women of reproductive age to determine any factors related to maternal mortality
• Creating workshops and radio spots to promote new health messages about danger signs, obstetrical evacuation plans, and pre/postnatal consultations
• Encouraging villages to participate in maternal mortality activities and to learn about and practice Natural Family Planning
• Human Reproductive Rights Training which emphasizes the maternal death surveillance program, the obstetrical evacuation plan, and laws relevant to marriage, cohabitation, adultery, and children
• Teaching interpersonal communication skills for nurses
• Identifying, counseling and referring pregnant market women who are at risk for maternal mortality by verbal consultation, blood pressure, and observation
• Promoting exclusive breastfeeding
• Promoting post-partum care
• Perinatal Data Management/PAHO (RAMOS)
• Teaching Child Spacing by LAM (exclusive breastfeeding to prevent ovulation) and the Standard Day Method (SDM) supported by Georgetown University (mothers use cycle beads to represent the menstrual cycle and timing of ovulation)
• Training staff in Neonatal Integrated Management of Childhood Illness
• Teaching health agents, traditional birth attendants and communities Home Based Life Saving Skills

d. HHF Funding

One third of the finding for HHF programs comes from USAID and two thirds comes from private sources. Donors include the Conrad N. Hilton Fund for Sisters, Catholic Relief Services, AmeriCares, CSS, The CORE Group, and The Institute for Reproductive Health at Georgetown University. The HHF Headquarters is located in Norwich, Connecticut. Its primary functions are administrative oversight, fundraising and coordination of volunteer activities. HHF health interventions are mainly focused on maternal and child health; community development is also a priority area.

A significant point regarding HHF programming is that HHF initiates and fundraises for programs that meet important population needs and that area sustainable after grant funding ends, rather than following funding trends. The effects of decreased funding based on trends are well illustrated by the examples of breastfeeding promotion, malaria eradication, and HIV treatment. Breastfeeding was of great interest in the 1990s, but is less visible on the international horizon today despite its importance in developing nations. Malaria programs had essentially eradicated malaria in the region, but funding ceased, and now the disease has returned to the region. Currently, HIV is the funding priority. President Bush's Emergency Plan for AIDS Relief (PEPFAR) provided increased funds to combat HIV/AIDS in the Caribbean because of its relatively high
prevalence in the region, although it is not the most prevalent problem. The US has committed $9 billion in new resources in 15 of the most afflicted countries in the world and has devoted $5 billion to ongoing bilateral programs in more than 100 countries. In addition, the US increased its pledge to the Global Fund to Fight AIDS, Tuberculosis, and Malaria to $2 billion through 2008. PEPFAR funding goes to the government and the hospital in Jeremie is the HIV/AIDS site. HHF will not accept grants for HIV/AIDS treatment until it is clear that it will be able to sustain them after grant funding ends.

e. The Health System

Health committees, mothers’ groups and fathers’ groups are the main resources for implementation of health and development activities in HHF registered villages. There are over 3000 community volunteers engaged in some aspect of improving health for themselves and their neighbors. HHF models an intergenerational approach to health and uses the teach-the-teacher model which is fundamental to the success of the organization’s many programs.

Health agents are health educators, encouraging families to practice health maintenance and life-saving behaviors. They also provide treatment for common illnesses. Nurses and health agents work together at health posts that are held monthly at various sites. People travel long distances on foot to attend the health posts where they receive acute care for illnesses, prenatal care, immunizations, counseling and other services.
HHF programs for maternal and newborn care, breastfeeding, nutrition, immunizations, and child spacing reach the communities by means of a primary care outreach program. HHF also has:

- An outpatient clinic (ophthalmology, EKG/sonogram, pharmacy, radiology, laboratory) staffed by one physician, nurses, auxiliaries, and administrative staff
- The Maternal Waiting Home at the Center of Hope that provides care and shelter for mothers with high risk pregnancies until they deliver
- The Nutritional Rehabilitation Center and Nutrition Pavilion are resources for education and food distribution

Other programs include community development, self-help, humanitarian relief responses to emergencies, and programs that facilitate the exchange of knowledge between Haitians and the international community (Gebrian et al., 2002). HHF also has a consistent program for distributing Vitamin A to children, and has won a national award in recognition of the high levels of coverage (Gebrian et al., 2002).

**f. Health Information System**

HHF uses a computerized database to manage information for each registered individual and family, tracking health information and service utilization. This information enables rapid detection of health indicators in each Health Agent service population.
V. National and Local Indicators for EBF in Haiti

With the impact of breastfeeding and HIV on population health, decisions and policy around these issues are at a crucial point for Haiti. The Haitian DHS 2000 indicated that EBF (based on 24hr recall) improved from 4% to 45.1% in the 0-2 month age group; however the total rate of EBF for infants under 6 months was only 23.6% (DHS Haiti, 2000). Moreover, a high percentage of women continue to mix breast milk and other foods from an early age (about 16% are mixing BF with water and over 58% are mixing in supplemental foods as early as 2-3 months of age) (DHS Haiti, 2000), indicating that EBF is a difficult standard to maintain. Low rates of EBF coupled with high rates of HIV, put infants at high risk for HIV infection. The HIV rates in Jeremie for the HHF population and pregnant women are similar to the national average at 4.5% and 4.4%, respectively (DHS, 2000 and HHF, 2005).

The Haitian DHS 2000 also demonstrated the effects of high HIV burden. Of children under 15, 9.4% to 10.9% were orphaned (mother, father or both dying of AIDS) (HIV/AIDS Survey Indicator Database DHS Haiti, 2000). High risk sexual activity remains prevalent, with 55% males and 31% of females engaging in high risk behavior in the last year although the percentage of males with multiple partners in the last year dropped from 80% in 1994 to 30% in the 2000 survey (HIV/AIDS Survey Indicator Database DHS Haiti, 2000). Condom use with higher risk sex partners is between 16-25% and dramatically less with a spouse or cohabiting partner at only 2-3% (HIV/AIDS...
Survey Indicator Database, DHS Haiti, 2000). In addition, 6% of the population is involved in commercial sex trade and uses condoms only 33-36% of the time (HIV/AIDS Survey Indicator Database DHS Haiti, 2000).

The population of young people in Haiti will be highly affected by the AIDS epidemic. About 47% of males and 21% of females indicated they had premarital sex in the last year of the DHS 2000 and only 26-31% of them used condoms (HIV/AIDS Survey Indicator Database DHS Haiti, 2000); about 39% of males and 3% of females reported multiple partners (HIV/AIDS Survey Indicator Database, DHS Haiti, 2000). Most worrisome was that only 5-15% of young people used a condom the last time they had sex (HIV/AIDS Survey Indicator Database, DHS Haiti, 2000).

The region of Jeremie has the same HIV rate compared to the national rate; it has the highest syphilis rates in the country. Recent surveys have demonstrated limited HIV knowledge, especially in non-HHF areas. In a society where premarital and extramarital sex is common and condom usage is inconsistent, giving out condoms is not the only solution to preventing HIV transmission. There is a stigma attached to using condoms such that if woman negotiates the use of a condom, she might be negatively labeled as “loose” by society. More information is needed to make modifications and incorporate new preventive and interventional programs for STIs, HIV, and MTCT.
a. Breastfeeding Practices in Jeremie

The KOMBIT baseline survey found considerable variation in EBF rates (range 25-88%) between villages (HHF and non-HHF), using the standard USAID Knowledge Practice Coverage (KPC 2000+; KOMBIT DIP 2005). The KPC 2000+ evaluates EBF based on a 24 hour recall, which may over estimate EBF.

Because of high rates of HIV transmission and under-diagnosis of HIV, it is imperative for HHF to understand whether women are practicing EBF of MBF. This is especially important for HIV positive mothers. Knowledge of women's understanding and practice of EBF will provide important information for EBF promotion.

b. The HHF Breastfeeding Program

HHF advocates exclusive breastfeeding in the Breastfeeding Program. Mothers in this group are referred from the prenatal program and are required to have had at least 4 prenatal visits to participate. About 60-70% of mothers follow through with the program. HHF administrators report that mothers who do not participate in the BF group are believed to have a higher SES. Participating mothers come to the Nutrition Pavilion at the Center of Hope once each month, where infants are weighed and vaccinated, and mothers are educated about EBF. Even if they do not attend the BF Program, mothers receive BF education during their prenatal visits. Women are taught to breastfeed before the placenta is expelled to decrease maternal bleeding after delivery. In addition, they are
encouraged to feed the colostrum to the infant, which is the first yellow milk that mothers express. The colostrum is rich in antibodies and nutrients that are beneficial for the infant. The education is essential to dispel the belief that the colostrum should be discarded and the infant should be given a purgative before beginning BF.

In addition to the BF group, EBF is promoted as part of a comprehensive maternal and child health program through the training of student nurses, Mothers’ Clubs, Behavior Change Communications program, and education with fathers and grandmothers. HHF provides HHF staff and mothers who are having BF problems breast pumps and this reinforces the importance BF. KOMBIT is working to improve educational messages and materials to ensure that breast feeding practices are easy to understand. Previous studies in 1998 indicated that 66% of women BF exclusively for the first 6 months of life in HHF registered sites, compared to 20% in non-HHF sites (Gebrian et al., 2002). These efforts have improved child nutrition and birth spacing. Further improvement is dependent on a better understanding of relationships between general BF practices and EBF.

More recently, the basic BF training for new nurses and health agents has not gone into as much depth as it did previously (HHF interviews, 2005). Improving the breastfeeding program in Jeremie will depend on training health agents and nurses on the updated guidelines by the WHO and continuing to teach the practical aspects of breastfeeding.
c. Pregnancy Prevention and Breastfeeding

Exclusive breastfeeding is also an effective method of preventing pregnancy. Lactation Amenorrhea Method or LAM (where EBF prevents ovulation) has been shown to be 98% effective in preventing pregnancy (HHF Internal Evaluation, 1998). With LAM, mothers are taught to begin breastfeeding within an hour or two of delivery, to breastfeed exclusively, to breastfeed on demand, and to seek another method of child spacing when they have their first post-partum menstrual period or when the baby is six months old. For mothers who do not wish to practice LAM, the Methodist Dispensary at Gebeau provides other child-spacing methods and welcomes HHF referrals. Natural family planning methods have been proven effective as the contraception prevalence in this region is high and the Total Fertility Rate (TFR) is 4.86 which is low for rural Haiti (HHF Internal Evaluation, 1998). Of note, birth spacing in Haiti is already wide because women are malnourished.

HHF training in the lactation amenorrhea method (LAM) of child spacing began in 1994 along with breastfeeding education. In 2005, HHF was named as the national trainer for LAM. HHF now trains all pregnant women in LAM. Among registered women of child-bearing age, 34% practice child spacing using HHF promoted methods. Of these, 13% practice LAM and 21% use other methods. About 76% of mothers with infants less than 6 months of age practice LAM according to surveys done in the mid-90s (HHF Internal Evaluation, 1998).
d. HHF and Partnerships for HIV/AIDS Care in Jeremie

Because HHF does not provide HIV/AIDS treatment, it works with other organizations that have treatment program. HHF is actively involved in HIV prevention and prenatal screening. This follows HHF’s general “ground up” public health approach compared to the more expensive vertical approaches that would focus specifically on AIDS. In the case of children’s diseases, diarrhea and pneumonia are the prevailing causes of morbidity as opposed to AIDS. As such, funding is directed towards treating certain diseases such as pneumonia with clotrimoxazole. A few cents per pill for antibiotics provides coverage for many more children than the very expensive HIV medications.

e. The ABC Youth Soccer Program

Abstinence is a major part of HHF’s HIV prevention program. HHF disseminates knowledge of human reproductive rights, negotiation skills, pregnancy, life planning, and alternative options for youth. Through an expansion of the Youth for Health program, young people are now using sports as an avenue to excel and be independent. The program uses soccer to attract both boys and girls to participate in a 6 lesson series on responsible sexuality, anatomy, physiology, puberty, AIDS and STIs, fertility awareness, negotiation skills, and life planning. These courses are taught by nurses. Human rights training will be added to the program as well. HHF estimates this program will train 900 youth from 30 villages as “Youth Health Advocates”. The program supports soccer training and local matches between rural villages during the summer. On World AIDS
Day 2005, HHF sponsored the “Youth for an AIDS Free Haiti” soccer exposition that engaged 50,000 people on important health issues. HHF hopes to document the impact of this program on the choices and health of these youth in the future.

f. The Maternal Waiting Home and Services by the Maternal HIV Surveillance Program before Delivery

The Maternal Waiting Home at the Center of Hope provides a pre/postnatal clinic for pregnant women from Jeremie and residential care for rural women with high risk pregnancies. It also provides a residential program for severely malnourished children. Every pregnant woman is counseled and offered HIV testing. The maternal HIV surveillance program was started in June 2004 and is staffed by nurses under the supervision of the medical director. About 150 women are tested each month, resulting in about 10 positive results. Women in remote areas are encouraged to come to the Center of Hope because the test is difficult to do at a health post. Women who are HIV positive are followed more closely during pregnancy. The HIV program provides counseling and clinical care to women and their children. Nurses teach about precautions that the mother should take to prevent the spread of the virus to her unborn child, including the administration of ARVs to mother and newborn at delivery and EBF. The nurses also provide newborn care counseling and emotionally prepare the mother for the possibility that her infant may be HIV positive. HIV positive mothers are encouraged to deliver at the local hospital, which works in collaboration with HHF.
The Government Hospital: St. Antoine

St. Antoine is a regional government hospital with about a total of 70 beds in the pediatric, adult, and obstetric wards. There are also outpatient services provided such as the STI clinic. Haitian and foreign physicians (mostly Cuban) manage the patients. The hospital has poor infrastructure and lacks electricity, water, and medical supplies. The operating room has been without functioning anesthesia equipment on several occasions. HIV management is by the HIV team. The hospital administers ARVs, performs c-sections and vaginal deliveries, and cares for HIV positive mothers and infants. Unfortunately, mothers who stay at the hospital often experience poor facilities, unfriendly staff, inadequate food, soiled bed sheets, and overt discrimination. Because it is a national HIV treatment site in the Jeremie area, there is a certain stigma associated with the hospital itself. For these reasons, many women who are referred to St. Antoine do not go to the hospital, deliver at home, and therefore do not receive ARV therapy. There is no system in place to ensure that women actually go to the hospital.

The government has not yet released AZT in the Grand-Anse area, so these mothers and infants only receive Nevirapine at delivery (both are distinct ARVs). Unfortunately, there is a great deal of resistance to Nevirapine. The hospital has been promised AZT by the government for quite some time, as the standard of care is to give AZT at 36 weeks gestation for the best outcome. HHF does not provide the drug as it is not recognized as a distributor by the government.
h. Maternal HIV Surveillance after Delivery

After delivery, mothers return to the Center of Hope (COH) and infants are entered into the child surveillance program. Infants are tested for HIV at 6, 12 and 18 months for using antibody testing. The Determine HIV1/2 rapid test kit is used first and all positive results are confirmed by the Capillus rapid test. A mother’s HIV antibodies can be detected in the infant as late as 18 months of age so testing continues to 18 months. If the infant is non-reactive at 18 months, the testing series is complete. However, if the infant is non-reactive earlier on, testing is completed regardless of continued BF. In addition, at each monthly postnatal visit, nurses counsel mothers on prevention of HIV transmission. This education previously recommended EBF for 3 months (the old WHO guideline). Currently nurses teach the new recommendation of 6 months of EBF with abrupt weaning. HIV positive women are tracked in a database that includes the age of the mother, number of prenatal visits, syphilis testing, date and site of delivery, whether she received nevirapine, months of EBF, and maternal and infant deaths. HHF uses Integrated Management of Childhood Illness (IMCI) to treat children with opportunistic infections but they do not treat HIV itself.

HHF surveillance is integrated into the community with no associated stigma. In fact, there is no way to distinguish between a regular postnatal visit and one that includes HIV counseling and testing for the infant. Further, mothers who do not want to receive care at the COH can be followed at the clinic. They have trust in the staff and in the confidentiality of services. To further protect mothers from the stigma of being identified
as HIV positive, bottles are not given to any mother. Mothers are taught to express breast milk into cup on occasions that they need to leave the child in the care of someone else. When an HIV positive mother abruptly weans the child and begins to feed from a cup, there is no obvious difference between her and the other mothers.

i. CARE Program

The CARE Program is a national program that provides education and supports people living with AIDS. HHF refers patients to this program. Of the current HIV positive mothers currently being followed in the maternal surveillance program, about 23% use CARE. CARE’s program provides free voluntary HIV testing, pre/post test counseling, food, soap, and medicines for opportunistic infections. Fathers can be tested at CARE, although it is common for women not to tell their partners for fear of losing financial support. In addition, CARE is known to be an AIDS support center so many people do not follow up referrals there either.

j. Family Health International

Family Health International (FHI) is another global and local resource for HIV positive people, providing monetary aid to families and schooling for children. FHI is beginning to collaborate with HHF.
VI. RESEARCH AIMS

The purpose of this study was to gain an understanding of EBF, including reliable methods for evaluating, maternal knowledge and related practices. It was also to gain insight into HIV/AIDS knowledge and EBF practices, including a group of HIV positive mothers.

- Evaluate the use of the 24 hour food recall compared to first 6 months food recall as a method of determining EBF.
- Assess HIV/AIDS knowledge using KPC 2000+ survey questions
- Assess knowledge of BF and EBF
- Identify factors associated with EBF, such as timing of BF initiation, colostrum, giving breast milk in a cup, receiving help with infant care, and infant HIV serostatus
- Determine differences between HIV positive mothers, mothers in the HHF BF group, and non-HHF mothers in EBF knowledge and practices and HIV knowledge
- Understand the social context and attitudes about EBF and HIV
VII. SUBJECTS AND METHODS

a. Subjects and Study Design

This was a cross-sectional study conducted in the town and rural areas of Jeremie, Haiti. Breastfeeding mothers in HHF and non-HHF communities were interviewed using a questionnaire assessing EBF, BF and HIV knowledge. Data about MTCT in the HIV population was collected from the records. Focused group discussions were held with mothers, fathers, and health care workers using open-ended questions to understand the social context of EBF and HIV. This study was approved by the Institutional Review Board of the University of Connecticut. Mothers were recruited during the months of October 2005 to January 2006.

Three groups of women participated in this study: mothers in the HHF BF group, HHF HIV positive mothers and non-HHF mothers. Mothers with infants between 0 to 24 months were included in the study as this was the population included in the previous KOMBIT KPC study. Mothers in the HHF BF group were recruited at the Nutrition Pavilion randomly on different days of the week when BF mothers came for education and food supplementation. Limitations of time and resources restricted HHF interviews to this location. The mothers in this group have diverse backgrounds in terms of being urban or rural and previous interaction with HHF. HIV positive mothers in the HHF HIV surveillance program were recruited separately at their regularly scheduled postnatal visits. If a mother was in both programs, only the HIV program survey was used.
Mothers in the non-HHF group were interviewed in their respective villages. Two rural communities outside of HHF and part of the KOMBIT area were selected - Abricots and Robin. In Abricots, all breastfeeding women were invited to participate in the study and 22 women were randomly selected from this group. All mothers who arrived were given soap, a washcloth, toothbrush and paste, and nail clippers as a token of appreciation for their time. These women had very little previous experience with any HHF programs. In Robin, a newly HHF associated village, mothers were selected from a health post. HHF has had some influence in this area, but not to the extent that it has in registered HHF villages. Unfortunately, only five breastfeeding women were present, so all five were included in the study, and were given similar kits in appreciation for their participation. These latter two groups were combined for a total of 27 non-HHF mothers. In total, 134 women were recruited, 32 HIV positive mothers from HHF, 75 from the Center of Hope, and 27 from non-HHF villages.

Interviews were performed in Haitian Creole with the help of translators. Five interviewers were trained in the administration of the questionnaire. All women in the HIV surveillance program were interviewed by a nurse, and all nurses were trained in the administration of the questionnaire. Prior to the interview, verbal consent was obtained. The questionnaire included standardized KPC questions including a 24 hour food recall. A complete food recall for the first 6 months of the child’s life was also included. Within EBF education, mothers are taught to put the infant to breast immediately, to feed the infant colostrum and to BF on demand. EBF knowledge questions were based on this
education. HIV knowledge was assessed using the KPC 2000+ questions. Knowledge of BF benefits was assessed using items the following items as criteria: bonding, decreased maternal bleeding, cost, infant nutrition, prevention of infant illness/infection, prevention of MTCT, and child spacing. Disadvantages listed by mothers were documented as well. The questionnaire for the HIV positive women was the same and additional data regarding the HIV status of the infant and the delivery of ARV therapy to the mother and infant was provided by the nurse from the database of the HIV surveillance program.

b. Data Collection and Statistical Analysis

Qualitative data from small group discussions was collected in a Word file. Completed questionnaires were coded and entered into an Excel file. Data was transferred to a Stata 8.2 file for analysis. Rates of EBF were determined using three variables based on whether the infant received any food or liquid; 1) during the first 3 days of life/before the first breastfeed, 2) the 24 hour food recall, and 3) the first 6 months of life food recall.

Because there were infants older than 6 months in the study, the 24 hour and 6 month food recalls could only be compared for infants who were younger than 6 months. To determine if each mother’s response for the 24 hour recall and the 6 month recall for each different liquid/food type were discordant, the McNemar test was used with the Exact test for variables with small numbers. This test was also used to compare the outcome variable of Exclusive Breastfeeding based on 24 hour and 6 month recall.
Data was analyzed for the entire sample size as a whole and separately for the groups of HIV positive women, Center of Hope (COH) women in the BF group, and non-HHF women. Rates were calculated as the percentage of total or subpopulation sample size. A One Way ANOVA with Post Hoc Comparison using the Bonferroni adjustment of the p-value was used to compare rates between the different study subpopulations for continuous variables. A skew test was performed and Kruskal-Wallis test was used instead of the one way ANOVA if the data was skewed. For binomial variables logistic regression was used to determine the differences between the HIV positive group and the non-HHF group relative to the COH group.

Cronbach’s alpha and correlation matrix were used to approximate the fit between the different knowledge items for breastfeeding and HIV/AIDS. Scaling was used to determine which items best fit together.

Finally bivariate and multivariate analysis was performed to determine the relationship between the independent variables and EBF (based on both the 24 hour and the 6 month food recall). Paired t-test was used for continuous variables and logistic regression using Chi-square was used for binomial variables. Categorical variables such as study population group were reorganized into binomial variables for this purpose. A forward selection in the logistic regression was used to generate the final model using a significant p-value of <0.05.
a. Description of the Data

A total of 134 women were involved in the study. About 24% of women were HIV positive and were being followed through the HHF surveillance program. About 56% of women were from the Breastfeeding Program at the Center of Hope. Together these women made up 80% of the sample and represented the HHF population. The non-HHF women made up the other 20% of the sample including 16% from the village of Abricots and 4% from Robin.

b. Maternal and Infant Characteristics

Comparison tests were used to determine if mothers and their infants had similar characteristics (Table 1). There was no significant difference in the mean age of mothers or the number of children between the groups. The mean age for infants was significantly higher in the HIV positive group (p<0.05) and the non-HHF group (p<0.05) (F=26.92 df= 128,2, p<0.001, ANOVA). In addition, female infants were overrepresented in the non-HHF group compared to the COH group (p<0.05).
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%)</td>
<td>134 (100)</td>
<td>32 (24)</td>
<td>75 (56)</td>
<td>27 (20)</td>
<td></td>
</tr>
<tr>
<td>Age of Mother in years</td>
<td>27.0</td>
<td>28.7</td>
<td>26.8</td>
<td>26.0</td>
<td>NS</td>
</tr>
<tr>
<td>Mean Number of Children</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3.5</td>
<td>NS</td>
</tr>
<tr>
<td>Mean Age of Infant in Months (SD)</td>
<td>6.8 (7.0)</td>
<td>7.3 (5.4)</td>
<td>4.1 (1.5)</td>
<td>13.9 (11)</td>
<td>F=26.92 p &lt; 0.001</td>
</tr>
<tr>
<td>Gender of Infant (% males)</td>
<td>54%</td>
<td>50% (OR = 1.6)</td>
<td>64%</td>
<td>30% (OR = 4.2)</td>
<td>b</td>
</tr>
<tr>
<td>Ever Breastfed</td>
<td>98%</td>
<td>97%</td>
<td>99%</td>
<td>100%</td>
<td>NS</td>
</tr>
<tr>
<td>Currently BF</td>
<td>82%</td>
<td>47% (OR=0.015)</td>
<td>99%</td>
<td>70% (OR=0.032)</td>
<td>b</td>
</tr>
</tbody>
</table>

a = significant difference between COH group and HIV group. b = significant difference between COH group and non-HHF group. c = significant difference between HIV group and non-HHF group. NS = Not significant.

c. Breastfeeding Characteristics

One of the criteria for EBF is that it be continued for the first 6 months of life. It was important to determine if women, especially those who were HIV positive, were breastfeeding for the full 6 months. Of the sample, 98% had breastfed at some time and 82% were breastfeeding at the time of the study. About 47% of the HIV positive mothers and 70% of non-HHF mothers were breastfeeding which was significantly less than the COH group (p<0.05) (See Table 1). Of the HIV mothers who were not BF, one mother still had an infant less than 6 months of age, nine (28%) had previously weaned at 3 months, and four (13%) had weaned at less than one month.
Regardless of continued BF, providing other food or liquid (weaning) earlier than 6 months, does not comply with the EBF standard. About 25 of the mothers (19%) had already weaned their infants at the time of the study. Of the 25 mothers who had weaned completely in this study, 15 (60%) women had weaned at less than 6 months. About 52% of women who had already weaned at the time of the study were in the HIV subgroup. Of the HIV positive mothers, only 13% weaned appropriately at 6 months.

Of the 110 women who had not yet weaned their infants, 87% planned to breastfeed for longer than one year. Of the 17 mothers in the HIV positive subgroup, 4 did not respond, 12% planned to wean at 3 months, 35% planned to wean at 6 months, and 29% planned to wean at greater than 6 months (18 and 24 months). This indicates that a significant portion of the HIV positive mothers are either planning to breastfeed for more or less than the recommended guideline of 6 months of EBF with abrupt cessation. Of the HIV mothers with infants who were 6 months or greater, 25% (4/16) were still breastfeeding their infants.

Since infants ranged in age from 0-24 months, an estimate for the total length of breastfeeding (not EBF) examined the age of infants who were already weaned and combined this with the age of infants that mothers planned to wean, if they had not yet done so. The results indicated that mothers breastfed for a mean of 17 (SD=11) months. Table 2 shows that HIV positive mothers BF for a shorter mean length of time (p<0.001) as would be expected (F=21.77, df=126,2, p< 0.001, ANOVA).
In addition to EBF for 6 months, other important factors that mothers are educated about include the timing of putting the infant to breast after delivery and feeding the infant colostrum. Table 2 shows that most women put their infant to breast greater than one hour after delivery. There was no significant difference in the time to breast between groups. Most of the mothers gave the infant colostrum, although this differed by group (78% of the HIV positive (p=0.07) and 70% of the non-HHF women (p=0.005) compared to 93% of the COH women).

Giving an infant any liquid or food other than breast milk does not meet the criteria for EBF. In this regard, 4% of women gave their infant food or liquid during the three days after delivery, before they first breastfed. About 1.5% gave milk, 1.5% gave water, and 1% gave sugar water before breastfeeding for the first time. Salt water, juice, milk powder, tea, honey, or “water for abdominal pain” were not reported to be given.

Table 2. Breastfeeding Practices among Groups

<table>
<thead>
<tr>
<th>Infant to breast within the first hour</th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non-HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>37%</td>
<td>44%</td>
<td>35%</td>
<td>41%</td>
<td>NS</td>
</tr>
<tr>
<td>Colostrum</td>
<td>85%</td>
<td>78%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>93%</td>
<td>70%&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Estimated length of BF in months (SD)</td>
<td>17 (11)</td>
<td>6.8 (7)&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>21 (11)</td>
<td>19 (8)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>F=21.77, p&lt;0.001</td>
</tr>
</tbody>
</table>

<sup>a</sup> = significant difference between the COH group and the HIV group.  
<sup>b</sup> = significant difference between the COH group and the non-HHF group.  
<sup>c</sup> = significant difference between the HIV group and the non-HHF group.  
NS = Not significant.
d. Specific Breastfeeding and Supplemental Feeding Practices

Although 96% of women gave breast milk during the first 6 months of life, nearly 22% also gave water before the age of 6 months and 19% gave some other milk to their infant. Further, 6% of all women used milk powder before 6 months, 6% gave juice, and 5% gave some other liquid. Among HIV positive women, 88% gave breast milk, 34% water, 31% other milk, 3% milk powder, 3% juice and 6% some other liquid.

More women in non-HHF villages gave water compared to the COH group (p<0.05). Mothers in the HIV positive group and the non-HHF group also gave other milk more often (p <0.05). There was no significant difference in the rates of the other liquids given before the age of 6 months. Figure 2 illustrates the liquids given.

To assess the validity of the 24 hour recall as a measure of EBF, responses were compared to the 6 month recall. Since there were infants older than 6 months in this sample, it did not make sense to compare the two measures for these infants since they normally could be eating other foods. Only infants under 6 months were used when comparing these groups. Accordingly, 4% of mothers reported giving water in the last 24 hours but 9% of mothers reported ever giving water before 6 months which shows that there is a difference in the responses although this was not significant. About 1.5% had milk powder in the last 24 hours compared to 5% who had ever been given milk powder before 6 months (not significant). No mothers reported giving juice or any other liquid in the last 24 hours or 6 months.
Figure 2.

Liquids Given to Infants before 6 Months of Age

N=134

With respect to food supplementation, 13% of mothers said that they gave their infant grains in the first 6 months of life, 5% meats, 5% legumes, 1.5% cheese, and 13% fat in some form (Table 3). Mothers also gave a variety of vegetables. As seen in Table 3, HIV women and non-HHF women were 35 and 26 times more likely to give their infants grains, respectively. HIV positive women were 5.5 times more likely to give their infants yams compared to COH women. Moreover, non-HHF women were 17 times as likely to give infants greens and mangos, 7 times more likely to give fruits or vegetables, 13 times more likely to give legumes and 22 times more likely to give fat of some kind. Figure 3 illustrates the distribution of foods given to infants before 6 months of age.

For infants under 6 months, only 1% of mothers reported giving grains, yams, greens, or fat in the past 24 hours and no mothers reported giving any of the other foods. Although more mothers reported giving foods over the first 6 months of life as compared to the 24 hour recall in infants under 6 months, this was not a significant difference (not shown).
Figure 3.

Table 3. Liquids and Foods Given to Infants before 6 months of age

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non-HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water before 6 months of age</td>
<td>22%</td>
<td>34% (OR=6)</td>
<td>8%</td>
<td>44% (OR=9)</td>
<td></td>
</tr>
<tr>
<td>Other Milk before 6 months of age</td>
<td>19%</td>
<td>31% (OR=5)</td>
<td>8%</td>
<td>37% (OR=7)</td>
<td></td>
</tr>
<tr>
<td>Grains in the first 6 months</td>
<td>13%</td>
<td>31% (OR=35)</td>
<td>1%</td>
<td>26% (OR=26)</td>
<td></td>
</tr>
<tr>
<td>Yams</td>
<td>6%</td>
<td>0% (OR=5.5)</td>
<td>4%</td>
<td>19% (NS)</td>
<td></td>
</tr>
<tr>
<td>Roots</td>
<td>5%</td>
<td>3% (NS)</td>
<td>3%</td>
<td>11% (NS)</td>
<td></td>
</tr>
<tr>
<td>Greens</td>
<td>5%</td>
<td>3% (NS)</td>
<td>1%</td>
<td>19% (OR=17)</td>
<td></td>
</tr>
<tr>
<td>Mango</td>
<td>5%</td>
<td>3% (NS)</td>
<td>1%</td>
<td>19% (OR=17)</td>
<td></td>
</tr>
<tr>
<td>Fruits/Vegetables</td>
<td>8%</td>
<td>6% (NS)</td>
<td>1%</td>
<td>22% (OR=7)</td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>5%</td>
<td>3%</td>
<td>0%</td>
<td>19%</td>
<td>NS</td>
</tr>
<tr>
<td>Legumes</td>
<td>5%</td>
<td>3% (NS)</td>
<td>1%</td>
<td>15% (OR=13)</td>
<td></td>
</tr>
<tr>
<td>Fat</td>
<td>13%</td>
<td>3% (NS)</td>
<td>1%</td>
<td>48% (OR=22)</td>
<td></td>
</tr>
</tbody>
</table>

This table displays the rates of different liquids and foods that were given based on the recall for the first 6 months of life. There was no significant difference in the rates for infants under 6 months using the 24 hour recall (not displayed). a = significant difference between the COH group and the HIV group. b = significant difference between the COH group and the non-HHF group. c = significant difference between the HIV group and the non-HHF group. NS = Not significant.
e. Overall Rates of True EBF

It was important to determine the validity of the 24 hour food recall compared to the recall for the first 6 months of life. Since there were infants older than 6 months in the study, the two measures were compared for infants younger than 6 months (the older group would ordinarily be eating supplementary foods at this stage). Table 4 displays EBF rates for the two measures for the whole sample as well as for infants less than 6 months of age, and Figure 4 illustrates EBF rates. Symmetry tests showed that there was no significant difference between the EBF rates as measured by the 24 hour or 6 month recall for the under 6 months group. Thus, the 24 hr recall is a good measure of EBF, and is an adequate test relative to a 6 month recall. However, given that there were infants older than 6 months in this study and that there was no difference in the food recall measures, the rest of the data analysis uses EBF based on the 6 month recall.

Table 4 also shows that about 73% of all mothers exclusively breastfed for the first 6 months of life (using the 6 month recall) and that about 69% of mothers practiced EBF regardless of age (using the 24 hour recall). The 24 hour recall showed that there were about 12 mothers who continued EBF with an infant older than 6 months (two were from the HIV group).

Discrepancies between the two standards for true EBF included one mother who had given her infant water and animal milk previously and one HIV mother who had given water, milk, and milk powder previously, but neither had not done so in the last 24 hours.
In addition, there were 3 mothers who had given water before the child was 6 months old, but had not done so in the past 24 hours. Five mothers had also given some other animal milk in the 6 months but not within the 24 hours of the study. Three mothers had given milk powder and one had given juice alone. Of the mothers with infants less than 6 months old, one had given grains in the first 6 months but not in the past 24 hours and one had given legumes.

Table 4. Exclusive Breastfeeding Rates

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non-HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>True EBF by first 6 months recall (N=134)</td>
<td>73%</td>
<td>53% (OR=0.2)a</td>
<td>87%</td>
<td>63% (OR=0.3)c</td>
<td></td>
</tr>
<tr>
<td>True EBF by 24 hour recall (N=134)</td>
<td>69%</td>
<td>47% (OR=0.2)a</td>
<td>84%</td>
<td>48% (OR=0.2)c</td>
<td></td>
</tr>
<tr>
<td>True EBF by 6 month recall for &lt;6months of age (N=79)*</td>
<td>89%</td>
<td>77% (OR=0.24)</td>
<td>93%</td>
<td>67% (OR=0.14) (p=0.054)</td>
<td>NS</td>
</tr>
<tr>
<td>True EBF by 24 hour recall for &lt;6months of age (N=79)*</td>
<td>91%</td>
<td>84% (OR=0.29) (NS)</td>
<td>95%</td>
<td>67% (OR=0.11)b</td>
<td></td>
</tr>
</tbody>
</table>

This table shows EBF rates by the first 6 months recall and the 24 hour recall for the entire sample in the first two rows. The third and fourth rows show the EBF rate for the less than 6 month age group. a = significant difference between the COH group and the HIV group. b = significant difference between the COH group and the non-HHF group. c = significant difference between the HIV group and the non-HHF group. NS = Not significant. * No significant difference between EBF rates using the 24 hour and the 6 month recall for all groups.
EBF rates for the whole sample and individual groups are displayed using the first 6 months recall.

f. Daily Activities and Breastfeeding

Mothers are taught to BF on demand both day and night as part of education in EBF and LAM. It is important to look at the number of times the mother breastfed an infant during 24 hours to understand whether or not BF is on demand. Although it was made clear that this question should include the number of times that mothers breastfed, about 17 mothers responded that they BF “many times” throughout the day and night. The mean was about 7 times daily. The mean per night was about 5 times. The number of
feeds can be affected by how much help the mother receives in caring for her infant. Help in childcare is also essential for the transferring of traditions and knowledge between generations.

In this sample, 79% of mothers received help in childcare (See Table 5). HIV positive and non-HHF mothers received much less help with childcare compared to the COH mothers (p<0.001). Of the women who received help, 57% reported help with feeding their infant. The non-HHF group was more likely to receive help with feeding the infant (p<0.05). Also, of the women who received help with infant care, 49% received help from the father, 22% from the grandmother, 10% from the aunt, and 10% from other caregivers (Table 5). The HIV mothers were less likely to receive help from fathers (p<0.05). There were no other statistically significant differences between the proportions of fathers, grandmothers, or women who helped with infant care among the groups.

Mothers can more easily have help with feeding their infants if the infant is accustomed to drinking from a cup. This allows the mothers to express milk and feed the baby at a later time or allows someone else to feed for her if she is away. Use of cups is essential in order for HIV positive mothers to make the transition to feeding other liquids when abruptly weaning at 6 months. Nearly 45% of women give breast milk in a cup including 19% of the HIV positive women, 67% of the COH women, and 15% of non-HHF women. Women in the HIV and non-HHF groups were much less likely to use cups than women in the COH group (p<0.001) (Table 5).
Table 5. Exclusive Breastfeeding and Infant Care

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non-HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help with infant care (N=134)</td>
<td>79%</td>
<td>53% (OR=0.12)a</td>
<td>91%</td>
<td>78% (OR=0.36)c</td>
<td></td>
</tr>
<tr>
<td>Help with infant feeding (n=106)</td>
<td>57%</td>
<td>40% (NS)</td>
<td>48%</td>
<td>63% (OR=3.7)c</td>
<td></td>
</tr>
<tr>
<td>Father helps</td>
<td>49%</td>
<td>47% (OR=0.4)</td>
<td>51%</td>
<td>33% (NS)</td>
<td></td>
</tr>
<tr>
<td>Grandmother helps</td>
<td>22%</td>
<td>12%</td>
<td>21%</td>
<td>26% NS</td>
<td></td>
</tr>
<tr>
<td>Aunt helps</td>
<td>10%</td>
<td>12%</td>
<td>12%</td>
<td>4% NS</td>
<td></td>
</tr>
<tr>
<td>Other Care Givers help</td>
<td>10%</td>
<td>12%</td>
<td>10%</td>
<td>11% NS</td>
<td></td>
</tr>
<tr>
<td>Mother Never Leaves</td>
<td>31%</td>
<td>63% (OR=0.13)a</td>
<td>16%</td>
<td>44% (OR=0.17)c</td>
<td></td>
</tr>
<tr>
<td>BM in a Cup</td>
<td>45%</td>
<td>19% (OR=0.13)</td>
<td>67%</td>
<td>15% (OR=0.09)c</td>
<td></td>
</tr>
</tbody>
</table>

a = significant difference between the COH group and the HIV group. b = significant difference between the COH group and the non-HHF group. c = significant difference between the HIV group and the non-HHF group. NS = Not significant.

In addition to receiving help from others, the amount of time a mother spends outside the home or away from the infant can have an impact on how the infant is fed. About 31% of mothers reported that they never left their baby and 66% reported that they left for less than 6 hours of time. The proportion of women who never left their infants was statistically less in the HIV and non-HHF groups compared to the COH group (p<0.001) (Table 5).
g. Breastfeeding Knowledge

**Table 6. Breastfeeding Knowledge**

<table>
<thead>
<tr>
<th>BF Benefit</th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non-HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonding</td>
<td>15%</td>
<td>13%</td>
<td>22%</td>
<td>0%</td>
<td>NS</td>
</tr>
<tr>
<td>Illness/Infection</td>
<td>80%</td>
<td>81% (NS)</td>
<td>89%</td>
<td>52% (OR=0.13)</td>
<td></td>
</tr>
<tr>
<td>Prevent HIV Transmission</td>
<td>5%</td>
<td>13% (OR=5)</td>
<td>3%</td>
<td>0%</td>
<td>NS</td>
</tr>
<tr>
<td>Infant Nutrition</td>
<td>34%</td>
<td>41%</td>
<td>28%</td>
<td>41%</td>
<td>NS</td>
</tr>
<tr>
<td>Maternal Bleeding</td>
<td>17%</td>
<td>19%</td>
<td>20%</td>
<td>7%</td>
<td>NS</td>
</tr>
<tr>
<td>Child Spacing</td>
<td>15%</td>
<td>0%</td>
<td>24%</td>
<td>7% (OR=0.25)</td>
<td>NS</td>
</tr>
<tr>
<td>Cost</td>
<td>54%</td>
<td>59% (NS)</td>
<td>65%</td>
<td>19% (OR=0.1)</td>
<td></td>
</tr>
<tr>
<td>Total Benefits Mean (SD)</td>
<td>2.1 (1.1)</td>
<td>2.3 (1.2) c</td>
<td>2.5 (1.0)</td>
<td>1.3 (0.7) b,c</td>
<td>F=13.54 p &lt; 0.001</td>
</tr>
</tbody>
</table>

a = significant difference between the COH group and the HIV group. b = significant difference between the COH group and the non-HHF group. c = significant difference between the HIV group and the non-HHF group. NS = Not significant.

Breastfeeding knowledge was measured by asking mothers to spontaneously list BF benefits. Scores were determined by the sum of items mentioned that are generally known benefits of BF. Table 6 summarizes the results for the BF knowledge items. There was no significant difference between the groups for bonding, prevention of HIV transmission, nutrition, bleeding, or child spacing. Non-HHF mothers were less likely to say that prevention of infant infection or illness and lowered cost are benefits (p<0.05). Only 5% of mothers knew that preventing the transmission of HIV is a benefit of BF. HIV mothers were 5 times more likely list this item although it was not significant (p=0.065). There were 1.7% of mothers who offered another benefit to BF which was that there would be fewer dishes to wash.
To develop the scale of BF knowledge, known benefits (a total of 7 as seen in Table 6) were used as the standards. One point was given to mothers for every BF benefit mentioned (Figure 6). On average, 2.1 (SD=1.1) BF benefits were mentioned by mothers. The non-HHF group scored significantly less than the COH group (p<0.001) (F=13.54 df=131,2, p< 0.001, ANOVA). There was no statistically significant difference in the knowledge scores of mothers younger or older than 25 years, or of mothers with one or more children. The only significant relationship with BF knowledge was infant age. Mothers with an infant younger than 6 months scored statistically higher (mean = 2.4, SD=1.1) compared to mothers with an infant 6 months or older (mean =1.9, SD=1.0) (p=0.0025) (not shown).

The knowledge scale was refined using Cronbach’s alpha and correlation matrix to determine if certain BF items correlated better together. The original alpha coefficient was 0.29 which increased to 0.35 if bonding and cost were omitted. Since this was not a great improvement this refined knowledge scale was not used in the analysis.
h. Disadvantages of Breastfeeding

Mothers were also asked to list some disadvantages of BF. Only 4% of mothers mentioned that BF was either painful or caused infection of the breast. Two mothers mentioned that BF was a disadvantage because there was no one to help with childcare. A few mothers mentioned other disadvantages, such as making the mother too weak.

i. HIV/AIDS Knowledge

HIV/AIDS knowledge was assessed using the KPC question format that asked mothers about ways to prevent the transmission of HIV. Mothers were asked to list responses (Table 7). Most women (93%) had heard of AIDS with no significant difference by group. All women in the study believed HIV could be prevented. HIV mothers were
more likely to list abstinence (p<0.05) and condoms (p=0.09). HIV and Non-HHF mothers were less likely to list being faithful (p<0.01). All other responses were not significantly different by group (Table 7).

HHF does not promote condom use because its program services are based on a Catholic philosophy, but condoms were identified by most (86%) of respondents. About 62% of mothers mentioned being faithful, 13% limiting the number of partners, 1.5% avoiding partners who have several partners. No one mentioned same gender sex and only two people (1.5%) mentioned IV drug (IVDU) use. Blood transfusions and injections were mentioned by 25% and 14%. Sharing razors was mentioned by 12% and prostitution by only 2%. Kissing was mentioned by two people (1.5%), both in the COH group. Mosquitoes and voodoo were not mentioned.

An HIV knowledge score was developed, similar to the BF knowledge score, based on 11 possible correct answers. The average score for AIDS knowledge was 2.3 (SD=1.1) overall (Table 7). The non-HHF group scored less than the COH (p<0.05) (F=5.63 df=131,2, p=0.0045). Figure 7 illustrates these differences. There was no significant difference in mothers AIDS knowledge scores with respect to age (under or over 25), number of children (one or more), or the infants age. AIDS knowledge was not statistically different in relationship to EBF. There was no relationship between AIDS knowledge and breastfeeding knowledge.
Table 7. HIV/AIDS Knowledge

<table>
<thead>
<tr>
<th>Transmission/Prevention Method</th>
<th>Total</th>
<th>HIV Positive Mothers</th>
<th>COH Mothers</th>
<th>Non-HHF Mothers</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstinence</td>
<td>18 %</td>
<td>34% (OR=2.8)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>16%</td>
<td>4% (NS)</td>
<td></td>
</tr>
<tr>
<td>Condoms</td>
<td>86 %</td>
<td>94% (OR=3.8)</td>
<td>80%</td>
<td>93% (NS)</td>
<td></td>
</tr>
<tr>
<td>Faithful</td>
<td>62 %</td>
<td>50% (OR=0.25)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>80%</td>
<td>26% (OR=0.09)&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>One Partner</td>
<td>13 %</td>
<td>16%</td>
<td>17%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Avoid partners with infected partners</td>
<td>1.5 %</td>
<td>3%</td>
<td>1%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Prostitution</td>
<td>1%</td>
<td>2%</td>
<td>0%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Same Gender</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0 (NS)</td>
<td></td>
</tr>
<tr>
<td>IVDU</td>
<td>1.5 %</td>
<td>3%</td>
<td>1%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Transfusion</td>
<td>25 %</td>
<td>31%</td>
<td>24%</td>
<td>19% (NS)</td>
<td></td>
</tr>
<tr>
<td>Injections</td>
<td>14 %</td>
<td>13%</td>
<td>16%</td>
<td>7% (NS)</td>
<td></td>
</tr>
<tr>
<td>Kissing</td>
<td>1.5 %</td>
<td>0%</td>
<td>3%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Mosquitoes</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Voodoo</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0% (NS)</td>
<td></td>
</tr>
<tr>
<td>Razors</td>
<td>12 %</td>
<td>6%</td>
<td>17%</td>
<td>4% (NS)</td>
<td></td>
</tr>
<tr>
<td>AIDS Knowledge Score (SD)</td>
<td>2.3 (1.1)</td>
<td>2.3 (1.4)&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.4 (1.1)</td>
<td>1.6 (0.7)&lt;sup&gt;b,c&lt;/sup&gt;</td>
<td>F=5.63 p=0.0045</td>
</tr>
</tbody>
</table>

The question asked “How can people protect themselves from getting AIDS?” <sup>a</sup> = significant difference between the COH group and the HIV group. <sup>b</sup> = significant difference between the COH group and the non-HHF group. <sup>c</sup> = significant difference between the HIV group and the non-HHF group. Significant if p <0.05. NS = Not significant.
j. Perspective on Child’s Health

Given the high rates of malnutrition and possibility of HIV infection in children, it was important to determine if there were any differences in mother’s perception of infant health between the three groups. Nearly 22% of mothers thought their child had excellent health, with 9% HIV positive, 21% COH and 37% non-HHF mothers (not statistically significant). Most (58%) thought their child had good health (41% HIV, 72% COH, and 41% non-HHF) with HIV and non-HHF mothers being over 3 times less likely to report good health in their infant (p=0.003, p=0.005). Overall, 15% thought their child had adequate health (44% HIV, 7% COH and 4% non-HHF). HIV mothers were 11 times more likely to report adequate child health status (p<0.001). Finally, 5% thought their child had poor health (6% HIV group; 19% non-HHF group, N.S.). These ratings are illustrated in Figure 7.
k. HIV Positive Mothers

Of the 32 infants in the HIV group who had been tested for the HIV virus at the time of the study, all were younger than 18 months and 14 of them were younger than 6 months. Seventeen infants were eligible for the 6 month HIV test and 12 (71%) were positive, while 5 (29%) were non-reactive. At the 12 month check-up there were 9 infants eligible to be tested. Five of these remained positive and 3 of the previously positive infants became seronegative. There were 21 infants who were not eligible for the 12 month test at the time of the study.
One of the important findings was that only 53% of mothers received ARV therapy at
delivery and 66% of infants were given ARV at delivery. The majority of HIV positive
women (75%) lived in Jeremie.

1. Factors Associated with EBF

Bivariate and multivariate analyses were used to determine which independent variables
were associated with true EBF. Since there was no significant difference between the 24
hour and 6 month recall, the variable for the 6 month recall was used in the analysis.
Because HIV mothers are instructed to cease BF early, they were about 6 times less likely
to perform EBF (p <0.001). The non-HHF group was 3.8 times less likely to perform
EBF than the COH mothers (p=0.01). There were no significant differences by maternal
age, number of children, or infant gender.

Mothers who put their infant to breast after the first hour after delivery were over 6 times
more likely to EBF (p <0.001) and women who reported giving the infant colostrum were
4 times more likely to EBF (p = 0.005). The rates are illustrated in Figure 8. Women
who practiced EBF fed their infants an average of 7.7 times per day compared to women
who did not practice EBF (5.1 times per day) (p=0.001). Similarly, mothers who
practiced EBF fed their infants on average 5.7 times per night compared to 2.9 times for
mothers who did not practice EBF (p<0.001).
Mothers who had some help with the infant were 3 times more likely to perform EBF (p =0.008) (Figure 9). However, Figure 9 shows that if the person who helped the mother helped with infant feeding, the mother was 5 times less likely to perform EBF (p=0.007). If the mother never left the home, she was over 3 times more likely to perform EBF (p=0.003). Similarly, if she used a cup to feed the baby, she was 3 times more likely to do EBF (p=0.003).

If a mother said that decreased cost was a benefit to breastfeeding, she was 2.3 times more likely to perform EBF (p=0.042). Furthermore, EBF mothers had higher BF knowledge scores (mean=2.3, SD=1.0) compared to non-EBF mothers (mean=1.9, SD=1.2) (p=0.03). There was no difference in the AIDS Knowledge Score between EBF and non-EBF mothers. If a mother believed that her infant had poor health, she was 10 times less likely to perform EBF (p=0.015). This was the only relationship between perception of infant health and EBF.

Multivariate analysis showed that a final model of factors that are associated with true EBF include the time to breast after delivery, whether the mother planned to or had weaned her infant after 6 months of age, if she mentioned cost as a benefit to BF, and whether she had help feeding with infant feeding (Table 8). This model indicated that if the mother put her baby to breast later, she was over 3½ times more likely to provide EBF to her infant (p=0.053). If a mother reported cost as a benefit to breastfeeding she was over 5 times more likely to practice true EBF (p=0.015). Finally, if there was someone who helped to feed the infant, the mother was 8 times less likely to perform true EBF.
Figure 8.

a. EBF Rate by Time to Breast

b. EBF Rate by Colostrum Given

c. EBF Rate by Help with Infant Care
Subgroup of mothers who had help with infant care (n=103).

Table 8. The Final Model of Factors Associated with Exclusive Breastfeeding

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratios</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to Breast (one hour after delivery)</td>
<td>OR = 3.6</td>
<td>p = 0.053</td>
</tr>
<tr>
<td>Weaning after 6 months</td>
<td>OR = 35</td>
<td>p = 0.005</td>
</tr>
<tr>
<td>Mentioned Cost as a benefit to BF</td>
<td>OR = 5.3</td>
<td>p = 0.015</td>
</tr>
<tr>
<td>Received help with infant feeding</td>
<td>OR = 0.13</td>
<td>p = 0.02</td>
</tr>
</tbody>
</table>

m. Weaning and Open Definitions of Exclusive Breastfeeding

The questionnaire contained two open-ended questions. Mothers were asked to describe their feelings when weaning the infant. This question was especially important for HIV mothers who are taught to wean abruptly. The second question was designed to ask mothers to define EBF. When mothers were asked about their experience with weaning there was a range of responses. Of the women with HIV, one woman expressed that she
thought her infant was going to die. Others indicated that the baby cried excessively and that this was very difficult for them. One thought that she was not a good mother. Another woman mentioned that although she wanted to continue to breastfeed, she knew that she would make her baby sick. Others mentioned that the infant had a difficult time eating and drinking other foods.

Some of the COH women expressed some of their own health concerns in regard to this question. One mother stated that she began to menstruate, one mother gained weight and experienced chest and stomach pain. Another always felt weak. One mother said that she felt very good. One mother had a sick baby who didn’t want to breastfeed, after which her breast milk dried up. One woman said that she knew that it was bad for her baby to continue to BF. The rest of the other women in this group had not yet weaned and therefore did not answer this question. Of the non-HHF women, one woman reported she had epigastric pains and another two women said that they felt ill and gained weight.

When asked to define EBF, there was a consensus among the mothers. Of the HIV positive mothers, 20 specified that it means BF without any other food or water. Only three said that they did not know. Of the COH mothers, 36% mentioned the acronym MAMA (LAM). Of these women, about half added that it means BF for 6 months. Nine of them explained further that it means BF for 6 months without other food/drink. About 9 women explained that it is a method that helps the mother and the baby. Of these, three specified that it helps prevent infection and illness in the infant. About 25% of mothers
discussed family planning. Five women did not know the meaning of EBF. Of the non-HHF mothers, two women discussed family planning, and four mentioned MAMA. Six mothers defined it as breastfeeding for 6 months without other foods. Seven women explained that it makes the baby strong, healthy and provides the baby with vitamins. One mother described it as BF with fruits added to the diet. Another mentioned that it is a process done with boiling water. Two women said that they did not know.

n. Small Group Discussions

Small group discussions were held with women from the Center of Hope as well as men and women from Robin (one of the non-HHF villages). These explored ideas about breastfeeding and HIV. Qualitative information was gathered to obtain a broader sense of breastfeeding and HIV within the community. A group of mothers from the Center of Hope’s recuperation program participated in a discussion about BF and HIV. This group included eight women aged 17, 24, 29, 35, 35, 36, 38, and 45 years. Their infants’ ages were 12, 29, 36, 38, 48, 52, 56 months, and 5 years. The discussion took place outside of the Nutrition Pavilion away from the rest of the group. All of the mothers were very engaged in the discussion and each offered her beliefs. The 17 year old mother was less verbal than the other mothers but still expressed her thoughts. Mothers seemed to be thinking independently and did not necessarily agree with each other. When asked about how they learned to BF, they responded that mothers’ groups and other women in their families were the main sources. They did not specifically mention the BF program as a source of information. These mothers accurately described EBF. They mentioned that
BF is the best nutrition source for infants under 6 months and that any food is good for a child after 6 months of age. They did not indicate whether certain foods were lacking nutrients for infants older than 6 months. They spoke openly about using cups to express milk to allow other care givers to assist in infant feeding. One woman explained, “You put breast milk in to a clean cup, cover it, and put it where another child is not going to drink it. Then you give it to whoever is taking care of the baby.” Also, mothers described that weaning an infant is a process that starts at 18 months of age, when feedings gradually diminish until 24 months when full cessation occurs. At that time, mothers bring more food into the house to accustom the infant to different types of foods. One mother said, “You want to diminish the feedings during the day and introduce juice and other foods more frequently, but you still give breast milk if the baby wants it.” Grandmothers are also involved in this process as they distract the infant from the mother’s breast. Moreover, some mothers will use aloe on the nipple (poor tasting) to deter the infant from feeding.

In terms of HIV/AIDS, most women had heard of the disease, but did not know anyone affected by it. When asked about outcomes for HIV infected persons the women simply explained that these people die. To understand sentiments about HIV positive people, they were asked what they would do if a cousin from Port-au-Prince with AIDS had a baby. They responded that they would encourage her to seek medical care. They later discussed that she should not have any more children because of her illness. One woman
questioned, “How would we know if someone had AIDS anyway?” Another said, “There are probably people around us that have it, but there is no way to know unless they tell us.” The other mothers agreed with this statement.

When asked about MTCT of HIV, mothers were aware that an HIV-infected mother could give her infant the virus, but they were not aware that this could be prevented. One mother asked, “When a pregnant woman has AIDS, is the baby not already positive because the baby is drinking the same blood?” They discussed that mothers should go to the hospital for treatment. One mother knew that BF could transmit the virus while another mentioned that BF for 2-3 months was permissible with abrupt cessation. The youngest woman said that BF should never be practiced by these women. The variation in response to this question might indicate that there are inconsistent messages on this topic.

Another question was what they would do if a woman in church was HIV positive. The women responded that they would encourage her to seek medical care and emphasized that they would never humiliate her. They elaborated that drinking and eating with infected people was risk free.

Women in Robin were asked the same questions. There were five participants aged 18, 19, 23, 25 and 36. Infant ages were 10 days (2), 1 month (2), and 2 months. These mothers responded in much the same way to many questions. When asked why a mother would not BF her infant, one mother said, “If the mother’s milk is not good. Sometimes
the child doesn’t nurse well and sometimes the milk is yellow.” These mothers expanded on the outcomes for people with AIDS explaining that they experience skin eruptions, weight loss, coughing, mouth sores and frizzy hair. In regard to a mother with AIDS, one mother said, “Never humiliate her. Don’t make jokes and never discourage her. If she doesn’t want to go to the doctor, talk to her, give her advice and go with her to her regular check ups.”

The three men in Robin were aged 23, 40, and 42. These men understood that BF was the optimal source of nourishment for infants before 6 months and that food after 6 months was permissible. However, when asked about water and juice, they agreed that these liquids could be given to an infant younger than 6 months. The men also helped their wives with much of the child care. When the mother was sick the father would feed the infant with another type of milk. These men were also familiar with AIDS and they offered that condoms are way to protect oneself. They explained that according to physicians, women who have AIDS can live longer now. They knew that a mother could transmit HIV to her infant in the womb, but one man heard on a radio broadcast that a woman with AIDS had an infant who was not infected. The men unanimously agreed that HIV positive mothers should not breastfeed. Similar to the women’s group, the men discussed treating people with HIV in a manner that would not humiliate them and expressed the need to befriend them. The men recognized that eventually people with HIV infection will die.
0. Limitations of the Data

One of the major limitations of this study resulted from time and resource restrictions, making it necessary to interview the majority of participants at the most accessible site, the Center of Hope. Limitations of focusing on women at this location, a busy location where women receive food rations, include that mothers might not have felt entirely comfortable revealing whether or not they had given food to their infants, despite reassurance of confidentiality. Mothers attending COH are more likely to be motivated to regularly attend the breastfeeding group monthly as compared to the 30%-40% of women who do not follow through with the program after delivery. There might also be different demographics of women who do not participate such as better socioeconomic status or increased distance from prenatal and BF programs at COH. HHF administrators believe that more affluent mothers participate in the prenatal care but not in the BF group. Mothers who were chosen in Abricots and Robin might have had some exposure to breastfeeding and other education programs, but this was not documented for any group. Broadcast messages were mentioned as a source of information by one of the men in the discussion group.

In addition, there were significant age differences between infants in the three subgroups. This was likely due to the method of recruitment given constraints of time and resources. There was a much higher proportion of mothers with older infants in the non-HHF group and this might have affected their ability to recall infant feeding practices.
The 6 month recall was used as the standard to determine EBF. It is possible that recall over a longer period of time is not accurate either. A more accurate approach would have been to follow women in a prospective study over time from delivery to cessation of BF. This likely would have improved the sample size as well, but would require more resources and time.

Finally, while there were 134 mothers in the sample, the distribution among groups was uneven (24% HIV, 20% non-HHF, 56% COH). Because the COH group was used as the reference group, this might not have greatly affected the results. However, if the other groups were larger, it would be possible to examine differences more extensively.

**IX. DISCUSSION**

Studies from different parts of the world have shown that EBF is the optimal method to decrease morbidity and mortality in infants as well as to decrease the risks of HIV MTCT. It has been shown that malnutrition is a critical cofactor in AIDS progression in resource-poor countries. Thus in communities with high rates of malnutrition in conjunction with high HIV burden, it is imperative to assess infant breastfeeding practices and intervene appropriately. In Jeremie, Haiti, AFASS is not supportable and EBF is currently the most appropriate feeding method. This means that HIV positive mothers should EBF infants until 6 months of age, at which time they should abruptly stop. This will provide maximal nutritional benefit from EBF while minimizing MTCT.
a. Methodology for Assessing EBF

The methodology for determining EBF rates was both a 6 month and a 24 hour feeding recall. The two methods produced similar results indicating that either method is useful for determining EBF rates in infants who are under 6 months of age. Although the difference in measurement between them was not statistically significant, there were some cases in which the 24 hour recall overlooked infants who were given food or liquid in the first 6 months. It is possible that this under-reporting might be significant with a larger sample size. There could be limitations with both methods so neither may be completely valid. This study’s results support the findings of a randomized trial of lactation counseling on EBF in Ghana that found a high correlation between the answers for EBF based on a 24 hour recall and a 6 month recall (Aidam et al., 2005). The best way to examine the validity of EBF measures would be to follow mothers and infants prospectively with observation and food recall.

b. EBF Rates

Using the 6 month recall, it was determined that EBF rates in Jeremie, Haiti are relatively high, with 74% of all mothers performing EBF overall and 87% within the HHF breastfeeding group. This result is congruent with previous studies at HHF in the mid-90s showing that LAM, which is based on EBF, was used by 76% of mothers with infants less than 6 months of age (HHF Internal Evaluation, 1998).
The rate of EBF in Jeremie is high compared to the national rate in Haiti of 23.9% (DHS Haiti, 2000). The rate in Haiti compares to rates in African nations: 27% in Zambia, 17% in Kenya, 11% in Malawi (UNICEF, 2000) and 35% in Uganda (Ssenyonga et al., 2004). In the Ghana study on lactation counseling, 39.5% were performing EBF over the entire 6 months with pre-, peri-, and post-natal EBF counseling as compared to 19.6% who did not receive EBF counseling (Aidam et al., 2005). Thus, HHF’s EBF rate is notable.

These results support the outstanding accomplishments by HHF in the education and support of mothers who breastfeed. Currently, only about 60-70% of pregnant mothers enter the HHF BF Program after receiving prenatal counseling. The reasons for lack of participation need to be investigated in order to identify who these women are and whether they are EBF. These associated factors could be used to “screen” during prenatal counseling to determine which women are not likely participate in the group, so that they can be encouraged to do so. In addition, HHF is already assessing the role of health agents and nurses in more remote villages in the rural breastfeeding program (different from the COH BF group), where access and education are limited. KOMBIT is assessing how best to reach women in non-HHF villages. These results further support KOMBIT’s efforts to develop EBF education.
c. Rates of EBF among Groups of Mothers

Infants born to HIV positive mothers are likely to benefit the most from EBF because their mortality and morbidity from other illnesses and likelihood of HIV transmission will be reduced. Yet, HIV positive mothers were five fold less likely to perform EBF compared to the COH group. Given that only 53% of this group performed EBF, it will be critical to target these mothers with specific messages reinforcing the new WHO guidelines. It was apparent that many mothers were not aware of the new standards, although they had general knowledge about MTCT. Future studies should examine the association between EBF and knowledge of MTCT. Additionally, KOMBIT should continue to improve messages about MTCT that target mothers with unknown HIV status (including the non-HHF groups who might not have access to recommended HIV testing during the prenatal period).

Non-HHF mothers had a 63% rate of EBF. This was high compared to Haiti rates, but relatively low when compared to the COH group, which was over three times more likely to practice EBF. Not only will it be critical to educate these mothers on the importance of EBF in general, but it will is especially important to make them aware of the risks involved with mixed BF because these mothers were more likely to give their infants a variety of foods and liquids than either HHF group. KOMBIT is involved in creating outreach through churches and women’s groups as a way to deliver BF education in non-HHF areas.
d. Factors that Affect True EBF and Barriers to EBF

Important factors affecting EBF included the time from delivery to putting the baby to breast, help with infant feeding, weaning age and consideration of cost as a benefit to breastfeeding. In addition, there were several factors affecting EBF that fell out of significance in the final model but are worthy of discussion and possible further study.

When the mother put the infant to breast more than one hour after delivery, the likelihood of EBF was increased threefold. This is counterintuitive since mothers are educated to BF immediately. There could be a confounding factor affecting the outcome such as education level or SES. The questionnaire might also be inappropriately worded. The concept of time and lack of watches and clocks may mean that this was not an accurate response. After the administration of the questionnaire, it was determined that a better question would have been to ask mothers if they gave breast milk before or after the placenta was expelled. The model also showed that mothers who planned to BF for longer than 6 months of age were more likely to perform EBF. Giving infants colostrum was important, although it fell out of significance in the multivariate analysis. Mothers who give infants colostrum may have a better understanding and a higher chance of practicing EBF. Mothers learned much of this information from the breastfeeding group as well as from other sources such as mothers' groups. Giving colostrum and EBF to 6 months of age should be emphasized. Health agents and nurses should also record if a mother gave colostrum and when she plans on weaning her infant, as potential indicators for future EBF.
Mothers who had general help with their infant had a higher rate of EBF. In contrast, the EBF rate was lower among mothers who had help with infant feedings. This suggests that if mothers leave infant feedings to others, infants might not be receiving breast milk at all times. Since fathers and grandmothers, in particular, are the gatekeepers to behavioral change in Haiti, more BF education needs to include fathers and grandmothers to ensure that infant feeding only includes breast milk. This can be accomplished by expressing milk into a cup. Women in the HIV and non-HHF groups used cups for breast milk eight and eleven times less than women in the COH group. If mothers are less educated in regard to using cups, they might associate using a cup with HIV stigma (since mothers with HIV abruptly wean and use cups). Since giving milk in a cup increased the likelihood of EBF, encouraging mothers to use cups for giving breast milk so they can maintain EBF is imperative. Not only is this important for infant feeding, but it decreases the stigma associated with cup feeds for HIV positive mothers and would make the transition to abrupt cessation easier. A recent symposium on BF and HIV recommended that HIV positive mothers with access to fuel could express milk into a cup and heat it. This will kill the virus and reduce MTCT, especially when weaning (Symposium on Breastfeeding and HIV & AIDS, 2005). This is a highly valuable recommendation as some HIV positive mothers who need to EBF before 6 months would probably also need to use breast milk as a major source of infant nutrition after 6 months given that their social situation is unlikely to change. However, it is not fully known how heating will affect the beneficial properties of breast milk.
Mothers who said that child spacing and cost were benefits to BF were more likely to have performed EBF. This association between BF knowledge and EBF rates indicates that mothers may be motivated by these aspects of BF. This might mean that these two points are emphasized during education, or that in times of hardship, these points are what motivate mothers to perform EBF. If certain aspects of education are more salient for mothers, then these features could be emphasized in education. Higher scores on BF knowledge were associated with a higher EBF rate. Further observational study of the breastfeeding education in group and individual counseling settings with nurses, as well as qualitative interviews and observation of individual mothers, are needed to better understand the factors of BF knowledge that influence EBF.

Maternal perception of infant health with respect to breastfeeding is currently a topic of interest in other studies and was important in this study as well. If a mother believed that her infant had poor health, she was much less likely to perform EBF. This suggests that she believes the infant requires nourishment from other sources for better nutrients or that there is something problematic with her own milk. It would be valuable to investigate the characteristics a mother considers when determining infant health status to compare these assessments to objective measures. Similar findings in a longitudinal cohort study in Zambia investigating the reasons for early cessation of EBF determined that mothers with infants small for their age were more likely to cease EBF early (Chisenga et al., 2005). Size might indicate to mothers that infants are not growing well and suggest that they need more than breast milk.
e. Supplemental Feeding

Water and other types of milk were the most common liquids given to infants before the age of 6 months. A smaller percentage of mothers fed infants milk powder and juice. Women who received their main education from the Center of Hope were less likely to give their infants these liquids than mothers in the HIV and non-HHF groups. Even though many of the HIV positive mothers were in the HHF BF group in addition to receiving supplemental counseling throughout the HIV management program, they remained more likely to have fed infants other liquids before 6 months (likely due to low knowledge of the new WHO guidelines and conflicting messages).

The types of solid foods given to infants before 6 months were mainly grains and fats, but all other foods were given by some mothers. HIV positive women and non-HHF women were much more likely to give infants grains. Non-HHF women in particular were more likely to give infants a variety of other foods compared to the breastfeeding COH group. These results suggest that mothers believe that water and other types of milk, grains and fats are appropriate foods to give infants. Understanding why mothers believe these foods or liquids are suitable is important to promoting EBF.
f. Breastfeeding Knowledge

Beliefs about food and liquid are important factors in decisions to perform EBF, but knowledge about BF in general is essential. The average score for BF knowledge was 2.1 out of a total of 7 potential points. HHF women had more knowledge of BF benefits compared to non-HHF women. Mothers with an infant younger than 6 months had more knowledge than mothers with older infants, suggesting that mothers of young infants are nearer to the counseling and retain information better. If this is the case, counseling should continue as infants get older to ensure that mothers retain this knowledge for future children and to educate other women.

Certain items of BF knowledge were more important than others. Illness and infection prevention was the main item identified by 80% of mothers. The non-HHF women were less likely to report this benefit. Furthermore, only the HIV women were aware of the specific decreased risk of HIV transmission, suggesting that this is not highlighted in regular breastfeeding counseling or peri-natal counseling. HHF is responsible for ensuring that mothers understand risks and benefits of breastfeeding especially when they are HIV positive or their serostatus is unknown. This is part of the counseling, but it is not clear how much this is emphasized. Mothers have the right to know all of the information that is available and to have critical information reinforced throughout the period of BF education. Future studies focusing on MTCT would assist in sorting out these issues.
Only 34% of women mentioned nutrition as a benefit to BF, further supporting the need for repeated messages on nutrition, breastfeeding, and HIV. Also, despite HHF education on the LAM method, which teaches about EBF and child spacing, only 15% of mothers mentioned child spacing. This goes against the idea that emphasized items are retained by mothers. The second most popular response was the cost of breastfeeding which was mentioned at a rate of 54%. This is not surprising given the socioeconomic status of many members of the community. However, it is not clear if this point is emphasized during the breastfeeding teaching. Observational studies to see what is emphasized will be important to help with these questions.

g. HIV Knowledge

Because EBF is critical to prevent MTCT, it was important to examine HIV knowledge. The KOMBIT baseline KPC survey in 2005 demonstrated that there was a low level of knowledge about HIV among women in the community. Most responses to AIDS knowledge were comparable to national results from the Haitian DHS 2000. About 93% of mothers had heard of AIDS (98% of females nationally). No mothers in this study said nothing could be done to avoid AIDS, indicating that most mothers had some knowledge about prevention. This compared to 24% of females in the DHS who thought nothing could be done. Eighteen percent of women mentioned abstinence as a method to prevent transmission compared to 11% in the DHS. Although abstinence is promoted, it is mainly for unmarried youth. Considering that 47% of men and 21% women have premarital sex nationally (DHS Haiti, 2000), it would be relevant to determine rates of
abstinence in this community to clarify if it is associated with knowledge about the role of abstinence in prevention. Another factor might be women's ability to negotiate sexual interactions with male partners.

While, condoms are not promoted by HHF, women were knowledgeable about them (86% of mothers in the HIV group). The knowledge about condoms was much higher than the DHS 2000 results, which showed 36% of females identified condoms. This might be a reflection of the various other organizations that are present in Jeremie, including the hospital and CARE International which do promote condoms or it could be due to the fact that condom knowledge has increased nationally in the past 6 years. This study did not examine condom use, but this would be important to determine. Women are being taught negotiation skills by HHF, but it will be important to determine if they use them and if there are improvements in such things as condom use, STI rates, and unintentional pregnancies. The DHS 2000 showed that about 95% of men and 88% of women believed in the ability of the woman to negotiate safer sex with her husband. Also, a recent study in rural Haiti found that 70% of women had easy access to condoms but that only 8-12% had ever used one (Smith Fawzi et al., 2004). Thus, it would be useful to understand what safer sex means to women in this community, if they actually make use of condoms, and if this is associated with knowledge. Prostitution was not a major consideration for mothers. According to HHF administrators, there are no obvious street prostitutes in this area, but there are women who have sex with men who will care for them financially. The sex trade is present but may be less visible.
Being faithful was mentioned by 62% of mothers, although both HIV positive and non-HHF mothers were much less likely to respond with this method (not specifically reported in the DHS 2000). Having one partner or limiting partners was only identified by 13% of mothers, which is much less than the 36% found in the DHS 2000 survey. A larger percent of mothers discussed the risks of transmission from blood transfusion (25%) and avoiding injections (14%), which are not significant modes of transmission in Haiti. Similarly, razor use was mentioned by a fair number of respondents yet this has not been determined to be a major method of HIV transmission. However, it is known that mothers are taught not to share razors.

Given the variation in responses, additional research is needed to investigate the effectiveness of health messages. HHF is not the sole source of education in this region as there are radio broadcasts, many other agencies in the region, and different educators within HHF itself. Determining whether or not health agents, nurses, physicians and other staff are disseminating consistent messages will be important for improving education.

No one mentioned that AIDS could be transmitted by voodoo or mosquitoes and only three people mentioned kissing. The Haitian DHS 2000 used prompted questions about misconceptions; 28% of women reported that HIV could not be transmitted by mosquitoes and 57% reported that it could not be transmitted by supernatural means. Given the negative question in the DHS, the results cannot be directly compared. It is
may be that the wording of the question did not prompt mothers to discuss these misconceptions and a study could evaluate these ideas further.

The overall HIV knowledge was low, (mean=2.3 out of 11). Among groups, non-HHF mothers had significantly less knowledge than the COH group. This demonstrates the need for increasing awareness of HIV transmission in non-HHF villages. However, low knowledge levels suggest that all women need more HIV information and education. Some knowledge items may not be emphasized in HHF education, others may not be feasible or acceptable (such as abstinence). HIV knowledge was not associated with BF knowledge. This might mean that certain educational pieces are not linked during teaching or are not retained by mothers. Literacy might be an important factor.

This study did not consider knowledge of MTCT specifically since the KPC questions were used. Research in Ethiopia has shown that 82.3% of women could name major routes of transmission and 89.9% knew that HIV could be transmitted from an infected mother to her baby (Jebessal et al., 2005). Results from the Haitian DHS 2000 showed that 73% of females were aware of MTCT, 59% of females knew that MTCT could occur by breastfeeding, and the same percentage believed that avoiding breastfeeding could prevent MTCT. Further studies in Jeremie should assess knowledge of MTCT. However, HIV knowledge of mothers was not associated with EBF in this study, which is consistent with the results of the Uganda study that included knowledge of MTCT (Ssenyonga et al., 2004). Even if knowledge of MTCT in Jeremie is not associated with EBF, it might be associated with HIV testing and treatment.
h. Major Social Change and Social Injustices

Knowledge about HIV/AIDS and EBF needs to be increased. The hope is that improved knowledge, among men and women, will increase healthy behaviors. The broader concern is the ability of women to negotiate safer sex and prevent transmission of HIV between partners as well as MTCT. Women in Haiti experience the challenges of gender inequality and oppressive poverty and often use survival strategies that increase the transmission of STI and HIV, such as trading sex for money or food. A recent study of women in rural Haiti found that 54% of women had forced sex in their lifetime; risk of forced sex was increased by poor SES, relationships longer than 4 years, having a partner with an STI and having used sex to provide for children (Smith Fawzi et al., 2004). HHF has played a role in social change through the teaching of negotiation skills and human rights in addition to the ABC Youth Program. It is essential that the evaluation system monitor the progress that is made by these programs, to observe changes in attitudes toward and use of safer sex methods.

Another intervention that would encompass men and women of all ages could be modeled after a study in Zambia that assessed the influence of partner participation on sexual risk behavior. Men and women were assigned to small same sex groups and were educated on sexual risks and strategies. Attitudes and knowledge were compared at baseline, 6 and 12 months after the intervention. Women reported higher rates of condom use, positive attitudes towards condoms, increased safer sex intentions, and less alcohol use before sex. Knowledge was higher for both sexes and was associated with higher
condom usage in males, fewer negative coping strategies and less substance usage (Jones et al., 2005). This suggests that group interventions for couples are a good way to introduce behavioral interventions, sexual negotiation skills, female controlled methods and counseling for all members of the community.

i. HIV Positive Mothers

In light of current theories supporting a decreased risk of MTCT of HIV with EBF, it is essential that HIV positive mothers clearly understand this method. As mentioned above, EBF rates in the HIV positive subpopulation were relatively lower than the COH group. It remains to be seen whether this will change with more aggressive implementation of the new WHO guidelines recommending EBF for 6 months.

j. HIV Status of Infants

HHF surveillance of HIV positive mothers and their infants is a step toward decreasing the risk of HIV transmission between mothers and infants. However, the technology for testing and treatment available in the developed world are not available in Jeremie for economic and political reasons. Of the 32 infants in the HIV positive group who had been tested for HIV, all were younger than 18 months and 14 infants were younger than 6 months (thus not yet eligible for the Rapid antibody test). Overall transmission rates could not be determined. The only finding was that non-reactive tests (29% in the 6 month age group and 56% in the 12 month age group) were not associated with EBF.
Non-reactive infants at any age are considered by staff to be uninfected and are not tested further. If nurses are not aware that some of the mothers continue to breastfeed after 6 months, then some infants might incur late infection with the risk of not being detected. Thus, it is recommended that HHF test all infants of HIV positive mothers for the entire period of breastfeeding.

k. Testing Infants

The HIV testing methods currently being used in Jeremie are the Determine and the Capillus tests which are both Rapid Antibody tests. These tests are very cost effective in developing countries, provide same-day results, and are highly sensitive and specific. Unfortunately, in infants born to HIV infected mothers, maternal antibodies can be found in the plasma of infants up to 18 months of age, thus impairing the ability of the standard antibody tests to detect if the infant is infected before this age. Clearly, antibody-based tests are not appropriate for infants. More importantly, they are inadequate for determining if infants have early infection (within the first 4 weeks) or late infection (after 4 weeks). This becomes important because infants with early infection tend to have higher mortality rates (Newell et al., 2004). Although, nurses are trained to recognize AIDS-defining illnesses, if a child is not brought to medical attention early enough, the child may die from treatable infection. Determining whether an infant is HIV positive at an early point would help mothers be aware of how to care for their infants.
For infants in developed countries, the usual test is the HIV DNA PCR assay, which is 96% sensitive and 99% specific by 28 days of age (King, et al., 2004). The benefit of this is that it can help determine the mode of transmission. Although a newer approach using dried blood spot specimens makes collection and storage much simpler, PCR tests are unfortunately too expensive to be used outside of research purposes in developing countries ($100 per test) (D'Adesky, 2002). If there was ongoing research on HIV transmission in the KOMBIT area, funding for PCR could be established.

Since HHF does not have the capacity to recognize which infants are infected in early infancy, it is important that staff members are aware of the factors that will increase the likelihood of transmission to the infant peri-natally. Prolonged rupture of membranes, chorioamnionitis, and preterm delivery all increase the risk of HIV transmission to the fetus. The use of antimicrobials in mothers has been suggested as one approach to reduce the costs of ARVs and transmission rates (Goldenberg et al., 1998). Staff should pay greater attention to potentially infected infants in order to treat any AIDS defining illnesses, as well as open mouth sores and thrush. In addition, giving infants prophylactic medications might be a more cost-effective solution to reducing HIV related infant mortality.
l. Treatment of Infants and Mothers

Identification of HIV infected mothers before delivery is required so that testing and ARV therapy can be initiated. When ARV therapy is initiated during pregnancy in developing countries it includes a single maternal and infant dose of NVP in addition to a short course of maternal AZT and either no infant prophylaxis or 1 week of infant AZT prophylaxis. A Ugandan study showed that administration of prenatal and intrapartum AZT to mothers and 6 weeks of AZT to infants decreased transmission rates; the addition of NVP made no difference but created NVP resistance. The equal efficacy of NVP and AZT, and the development of NVP resistance have been shown in many studies (Taha et al., 2004; Eshelman et al.; 2006; Coetzee et al., 2005). Thus currently, single dose NVP is not recommended (King et al., 2004).

At this point, HIV positive women referred to the hospital are only offered one dose of NVP. Studies have shown that more complex regimens can be delivered effectively on a large scale within the routine health care system in areas with high prevalence of HIV (Coetzee et al., 2005)). HHF might be able to deliver this care but is hindered by the government's lack of provision of AZT in the region as well as the need to refer women to the hospital to receive therapy. This is likely to continue as the hospital is the official ARV site for the region. Most women do not deliver at the hospital and there is reason to believe that stigma prevents mothers from seeking care.
**m. Stigma and Effects on Treatment**

General barriers to HIV treatment are stigma, high cost, lack of infrastructure, and poor adherence. Stigma is a complex issue rooted in social inequalities that changes as societies change. It has been proposed that “structural violence” can be used as a framework for understanding AIDS-related stigma where forces that shape society including racism, sexism, political violence, poverty and other social inequalities all exacerbate one another (Castro and Farmer, 2005). For example, the disclosure of HIV status of a wife to her husband in the context of sexism can lead to domestic violence, which can prevent women from seeking care.

In this study, many HIV positive mothers did not receive treatment, as only a small number went to the hospital for ARV therapy at delivery. The difference in the ARV therapy received by mothers and infants (53% and 66% respectively) might illustrate refusal of meds or that meds were not offered or available to the mother at delivery. According to the KOMBIT baseline KPC in 2005, 90% of mothers deliver at home with traditional birth attendants. Even when referred to the hospital, many HIV mothers deliver at home. Anecdotally, there have been many HIV positive mothers who were dissatisfied with their treatment at the hospital during delivery. There is a known case where the hospital was low on gloves and staff left an HIV mother to deliver her baby on her own without any assistance. This indicates a high level of discrimination by hospital staff toward HIV positive mothers and their infants. In addition, given that the hospital is
the only governmentally recognized location for distribution of ARV therapy, women may fear being identified as HIV positive if they go there. This increases the risk of MTCT. These factors require further investigation.

To ensure that mothers connect with appropriate medical care, there should be a follow-up system for referrals and this is part of KOMBIT. One model for doing this is a program that is already successful in Haiti and other countries for TB and Highly Active ARV Therapy (HAART), programs known as the DOT Program (Directly Observed Therapy). The program uses “Accompagnateurs” who are people from the community who link the villages to the clinic and who directly observe the HIV patients when they take their medicines on a daily basis (Behforous et al., 2004). In addition they offer emotional support. This model could enable HIV positive mothers to reach the hospital and receive ARV therapy, and would presumably help to decrease the stigma associated with the hospital since the community would be mobilized. There are concerns about privacy however. There is great need for the hospital to collaborate with HHF and other programs to ensure that all patients are being treated with a high standard of care. Unfortunately the lack of resources and capacity are likely to hinder this progress.

It was evident in speaking with nurses and other staff members at HHF, that morale is low about the ability to ameliorate these issues. There is a sense of helplessness. Ideally, the government should recognize HHF as an official distributor of ARVs, if only for pregnant women. This would be useful because AZT given at 36 weeks can dramatically reduce the rate of MTCT, and giving this medication would increase adherence to
treatment. Use of AZT would reduce NVP resistance. The stigma would be less since mothers would receive therapy early on, in the context of their regularly scheduled prenatal appointments. It would make treatment of HIV/AIDS in pregnant women as routine as treatment of other STIs. In the future, the maternal waiting home could also include a maternity ward, but for this to occur, the government would have to agree, and the number of physicians and other staff would have to increase the capacity for care. In summary, access to treatment and improved clinical services would improve the quality of prevention, reduce stigma and boost staff morale (Behforous et al., 2004). Future studies should investigate stigma as a possible cause for low use of services.

In addition, long-term treatment of people affected by HIV/AIDS has been demonstrated to decrease stigma, because it changes community perceptions so that HIV is no longer perceived as a death sentence. When treatment is available, voluntary testing has been shown to increase (Castro and Farmer, 2005). Testing is essential since over 90% of people infected with HIV are unaware of their status. At the Partners in Health, Clinique Bon Saveur in Cange, Haiti, the voluntary testing program averages 2118 patients monthly (Castro and Farmer, 2005) compared to about 2600 annually at HHF. Funding for HIV testing and treatment must be increased in Jeremie, so that more people can be tested and treated. This would result in more mothers seeking therapy to reduce MTCT. Unfortunately, despite the lowered costs of generic 3-drug ARV regimens in Haiti (less than $1 per day or less than $200 per patient per year) (Farmer, 2005), HIV therapy is
still relatively unaffordable. In addition, if extra funding for HIV treatment is identified for HHF, the funding must be sustainable over many years and must not reduce funding for basic primary care and public health interventions.

n. Long Term Therapy and Monitoring

At this point it is unclear if long term HIV treatment of mothers in the Jeremie region is sustainable. A recent study in Port-au-Prince determined the efficacy of a three-drug ARV therapy regimen in 1004 patients with AIDS at an overall cost (including personnel, lab monitoring, other medications, and miscellaneous) of $1600 per patient per year. The one year survival was 87% of adults and adolescents and 98% of children compared to the one year survival in developing countries of 30% (Severe et al., 2005). This showed that even during times of political unrest, ARV therapy can make a difference in developing countries. This study was supported by the Global Funds to Fight AIDS, Tuberculosis and Malaria and the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR).

The Clinton Foundation recently announced that a new initiative to negotiate with pharmaceutical companies would lower the cost of AIDS medications in developing countries. Even if funds for treatment are available, testing and monitoring of therapy for effectiveness, failures, toxicities, adherence and emergence of resistant organisms is difficult and costly. The reference standard for CD4 cell testing is flow cytometry enumeration of T cells (Crowe et al., 2003). Viral load is best determined by RT-PCR,
branched DNA and nucleic acid base amplification. These are expensive and not readily available in resource poor countries. The WHO has proposed simple clinical criteria in addition to low cost lab testing with a minimum standard of total lymphocyte count. Viral loads should be done where there are lab resources as clinical monitoring does not allow for tight control (Crowe et al., 2003).

A recent study of an information system and medical record support in rural Haiti described an innovative technology and community based HIV treatment program. It consisted of satellite and internet resources through telemedicine to overcome some of the infrastructure deficits in Haiti and allowed tracking of individual patients and groups of patients. This was an expensive intervention; the cost is about $1600 per year for an internet connection at one site (Hamish et al., 2004). It was funded by part of a grant from The Global Fund to Fight AIDS, TB, and Malaria. These advances show that there is a future for AIDS therapy even in rural Haiti with funding from the international community.

0. Ethics and Human Rights

The larger issue is human rights. Mothers are asked to have HIV testing, and when this is mandatory, it removes their rights. In Haiti, testing is voluntary; however, given the social circumstances of the people and HHF’s dominant role in this community, it would not be surprising if mothers felt they had to be tested. In addition, it is concerning that
HHF provides testing, but not treatment or assurance of ARV therapy with delivery at the hospital. As mentioned above the model of “Accompagnateurs” could be helpful in this respect.

Another human rights point to discuss stems from the Universal Declaration of Human Rights. Paul Farmer is an M.D., Ph.D. working for Partners in Health in Haiti and other parts of the world. He speaks of AIDS treatment and prevention in the light of these rights.

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing, and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control. –Article 25

In addition, Article 27 states that “Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits” (Farmer, 2005). The Universal Declaration of Human Rights argues for the need to ensure that all people have equal opportunity to access new technologies and medications. Societies should guarantee access to everyone, not just the affluent.

Moreover, these rights as applied to infant feeding alternatives imply that a woman should have the right to choose how she feeds her child and that an infant has the right to be nourished in the safest and most nutritious way. States should take action to ensure that this is possible as stated in the International Covenant on Economic, Social and Cultural Rights-Article 11 (Kent et al., 2003).
In general, the benefits and risks of various feeding alternatives in the local circumstances should be discussed with the mothers in an unbiased manner to allow them to make informed choices about benefits of breastfeeding and risks of malnutrition. Furthermore, infants are entitled to expect that the government will help to make quality feeding alternatives available including expressed and heated breast milk or breast milk from others obtained through wet nurses, milk banks, and other methods (Kent et al., 2003). Unfortunately, Haiti’s economic and political situation will delay these basic rights.

p. Conclusions

In summary, EBF is not only important for optimal nutrition, but in resource poor countries, it seems to be the best way to help prevent morbidity and mortality including HIV infection by MTCT up to 6 months of age. In order to ensure that mothers and infants are receiving the best care and information possible, more research needs to be done monitoring maternal and infant health outcomes as well as feeding practices.

Given the ethical and human rights dilemmas of breastfeeding versus alternative food sources, mothers and infants should be given individual assessments of their circumstances to advise appropriate measures. This would include assessing the access to clean potable water, electricity, and other measures of SES. As recommended by the WHO, only if AFASS is met, should a mother be encouraged to try supplemental foods in place of EBF when she is HIV positive. Mothers should be encouraged to make informed choices, however, and not be coerced by the providers’ recommendations. New
and innovative ways to feed infants at risk for HIV must be comprehensively studied (including the expression of milk and heating it to kill the virus, milk banks and wet nurses). These alternatives could be effective especially for women who continue to BF after 6 months and who do not meet standards for AFASS.

With lower EBF rates among HIV positive women, it is clear that information about the new guidelines for EBF up to 6 months are not being disseminated as quickly as needed. Thus proper training of nurses and health agents should be implemented. In addition, all mothers should be educated about the benefits of EBF in general and to minimize the additional risk of MTCT.

Ensuring that mothers adhere to hospital referrals for ARVs, and that stigma within the community are diminished is also essential. The acceptance of HIV positive mothers in the community is critical for treatment success. One method to ensure that mothers who are HIV positive reach the hospital for delivery and obtain ARV therapy could be DOT type programs (“Accompagnateurs”). In addition, hospital staff should be trained to ensure that all women and infants are treated equally regardless of their HIV status. Infants and mothers need advocates to ensure that the government and local organizations are providing all of the necessary and available treatments and support. This will require a national policy outlining the rights of infants and mothers, options for feeding, and treatments offered to prevent MTCT of HIV. This would help build the necessary infrastructure and enhance care.
X. SUMMARY OF RECOMMENDATIONS

Recommendations for Measurement

1) Use 24 hour recall as an indicator for EBF (for infants under 6 months).

2) Use giving colostrum as a predictor of EBF and provide mothers who didn’t give colostrum additional counseling/education.

3) Determine the effects of SES and education on HIV and EBF knowledge.

4) Determine the relationship between infant outcomes, including health status and EBF and mother’s perception of the health of the infant; assess accuracy of mothers’ judgments about infant health.

5) Determine consistency of HIV and BF messages between organizations in Jeremie and between health agents/nurses in HHF.

6) Identify men and women’s perceptions about safer sex methods and their actual practice.

7) Using grants or investigational funds, use PCR method for testing HIV status of newborns; continue testing until infants are no longer BF.

Recommendations for Mother and Infant Interventions

1) Identify women and reasons for non-participation in the HHF BF Program, and develop effective outreach.

2) Update training for nurses and health agents on EBF and MTCT in HHF. Develop linkages with church and women’s groups in non-HHF villages. Train staff to recognize higher risk and HIV positive women and treat infections early.

3) Emphasize cost as a benefit to BF and ensure BF knowledge in general. Promote use of cups to express milk, and heating breast milk after 6 months (HIV positive mothers).

4) Investigate why mothers believe there is a need for water or other milk before the age of 6 months.

5) Include fathers and grandmothers in breastfeeding education.

6) Consider group interventions about forced sex, negotiation, and use of safer sex methods.
7) Advocate for the government to provide needed drug regimens for HIV mothers and infants in the Grand Anse. Promote specific national policies on breastfeeding and MTCT of HIV.

8) Decrease stigma and increase adherence by considering the use of Accompagnateurs to help mothers reach the hospital; collaborate with hospital staff and reduce discrimination toward HIV positive mothers.

9) Ensure that mothers are able to make truly informed choices when deciding to EBF their infants, considering AFASS, HIV serostatus, risks and benefits of EBF.

10) Consider ways to increase funding for long term HIV treatment.
XI. REFERENCES


### XII. APPENDIX
SURVEY FOR EBF QUESTIONS

<table>
<thead>
<tr>
<th>QUESTIONS</th>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age of the mother</td>
<td></td>
</tr>
<tr>
<td>2. Number of children</td>
<td></td>
</tr>
<tr>
<td>3. Age of youngest child</td>
<td></td>
</tr>
<tr>
<td>4. Gender of youngest child</td>
<td></td>
</tr>
<tr>
<td>5. Child’s current weight</td>
<td>In kg</td>
</tr>
<tr>
<td>6.* A. Did you breastfeed your child (name)?</td>
<td>Yes, No</td>
</tr>
<tr>
<td>B. Are you currently breastfeeding?</td>
<td>Yes, No</td>
</tr>
<tr>
<td>7.* After the child was born, how much time passed before you started breastfeeding?</td>
<td>Immediately after birth/during the first hour</td>
</tr>
<tr>
<td>8.* During the first three days after childbirth did you give your baby (name) colustrum (yellow milk) or “water” from the breast?</td>
<td>Yes, No, don’t know</td>
</tr>
<tr>
<td>9.* A. During the first three days after childbirth did you give your baby (name) other food or other drink before you breastfed?</td>
<td>Yes, No, don’t know</td>
</tr>
<tr>
<td>B. What foods or drink did you give. List all the things the person tells you.</td>
<td></td>
</tr>
<tr>
<td>10. A. Did you ever give your baby (name) other food or other drink before you breastfed?</td>
<td>Yes, No, don’t know</td>
</tr>
<tr>
<td>B. What foods or drink did you give. List all the things the person tells you.</td>
<td></td>
</tr>
<tr>
<td>11. A. Are you currently breastfeeding?</td>
<td>Yes, No</td>
</tr>
<tr>
<td>*B. How long will you breastfeed?</td>
<td>In months</td>
</tr>
</tbody>
</table>

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*Note: The table is not fully visible due to the text extraction limitations.*
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. If you have weaned your baby, how old as he?</td>
<td>A. In months ____</td>
</tr>
<tr>
<td></td>
<td>B. In months ____</td>
</tr>
<tr>
<td>13. Now I would like to ask you questions about the quality of the</td>
<td>Yes, No, don't know</td>
</tr>
<tr>
<td>liquid (water) that the baby ____________________________ (name) drinks</td>
<td>Mother's milk</td>
</tr>
<tr>
<td>during the day and night.</td>
<td>Simply water</td>
</tr>
<tr>
<td></td>
<td>Bottled milk, powdered milk, cow's milk</td>
</tr>
<tr>
<td></td>
<td>Powder milk purchases at the market</td>
</tr>
<tr>
<td></td>
<td>Natural juice</td>
</tr>
<tr>
<td></td>
<td>Other liquid (sugar water, tea, coffee, soda, stew)</td>
</tr>
<tr>
<td>14. Did ____________________________ (name) drink liquid or one of the</td>
<td>Yes, No, don't know</td>
</tr>
<tr>
<td>following during the first 6 months of life or before he was weaned?</td>
<td>Mother's milk</td>
</tr>
<tr>
<td></td>
<td>Simply water</td>
</tr>
<tr>
<td></td>
<td>Bottled milk, powdered milk, cow's milk</td>
</tr>
<tr>
<td></td>
<td>Powder milk purchases at the market</td>
</tr>
<tr>
<td></td>
<td>Natural juice</td>
</tr>
<tr>
<td></td>
<td>Other liquid (sugar water, tea, coffee, soda, stew)</td>
</tr>
<tr>
<td>15. Food that was made with grain (like flour, sorghum, corn, rice,</td>
<td>Yes, No, don't know</td>
</tr>
<tr>
<td>white flour, porridge, or other local grains?</td>
<td>Mother's milk</td>
</tr>
<tr>
<td></td>
<td>Simply water</td>
</tr>
<tr>
<td></td>
<td>Bottled milk, powdered milk, cow's milk</td>
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<tr>
<td></td>
<td>Powder milk purchases at the market</td>
</tr>
<tr>
<td></td>
<td>Natural juice</td>
</tr>
<tr>
<td></td>
<td>Other liquid (sugar water, tea, coffee, soda, stew)</td>
</tr>
<tr>
<td>Yams yellow yams, carrots or red potatoes or sweet potatoes?</td>
<td></td>
</tr>
<tr>
<td>All other food made with roots or potatoes, white yams, manioc or other</td>
<td></td>
</tr>
<tr>
<td>local roots</td>
<td></td>
</tr>
<tr>
<td>Green leafy vegetables?</td>
<td></td>
</tr>
<tr>
<td>Mango papaya. Other fruit in the area near your house that are rich</td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td></td>
</tr>
<tr>
<td>Other fruits or vegetables (plantains, apples, avocados, or tomatoes)?</td>
<td></td>
</tr>
<tr>
<td>Meat, poultry, fish, seafood or eggs?</td>
<td></td>
</tr>
<tr>
<td>Food made with vegetables (like lentils, beans, oil, vegetables whit)?</td>
<td></td>
</tr>
<tr>
<td>Cheese or yogurt?</td>
<td></td>
</tr>
<tr>
<td>Food made with oil, grease or butter?</td>
<td></td>
</tr>
<tr>
<td>16. Now I would like to ask you about the quality of food that</td>
<td>Yes, No, don't know</td>
</tr>
<tr>
<td>____________________________ (name) ate yesterday and last evening.</td>
<td></td>
</tr>
<tr>
<td>Check next to box if baby has eaten this food.</td>
<td></td>
</tr>
</tbody>
</table>
next to box if baby has eaten this food.

<table>
<thead>
<tr>
<th>Food that was made with grain (like flour, sorghum, corn, rice, white flour, porridge, or other local grains?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yams yellow yams, carrots or red potatoes or sweet potatoes?</td>
</tr>
<tr>
<td>All other food made with roots or potatoes, white yams, manioc or other local roots</td>
</tr>
<tr>
<td>Green leafy vegetables?</td>
</tr>
<tr>
<td>Mango papaya. Other fruit in the area near your house that are rich Vitamin A</td>
</tr>
<tr>
<td>Other fruits or vegetables (plantains, apples, avocados, or tomatoes)?</td>
</tr>
<tr>
<td>Meat, poultry, fish, seafood or eggs?</td>
</tr>
<tr>
<td>Food made with vegetables (like lentils, beans, oil, vegetables whit?</td>
</tr>
<tr>
<td>Cheese or yogurt?</td>
</tr>
<tr>
<td>Food made with oil, grease or butter?</td>
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</tbody>
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<table>
<thead>
<tr>
<th>A. How many times did the baby eat during the day?</th>
</tr>
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<tbody>
<tr>
<td>B. How many time did the baby eat at night?</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>A. If you stopped breastfeeding at one point, what age was your child?</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. At what age did you introduce food or drink/water other than breastmilk</td>
</tr>
</tbody>
</table>

| What was it like for you to switch from breastmilk/breastfeeding to feeding with other liquids/food? |

<table>
<thead>
<tr>
<th>A. Did anyone help you care for your child?</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. If yes, did this person help feed the child?</td>
</tr>
<tr>
<td>C. Who is this person relative to the child?</td>
</tr>
</tbody>
</table>

| Are you ever away from the baby for long periods of time when the baby is being breastfed? |

<table>
<thead>
<tr>
<th>A. Have you ever expressed breast milk into a cup and fed it to the baby with a cup and a spoon?</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. If yes, was this a difficult transition for you?</td>
</tr>
</tbody>
</table>

| What does it mean to do “exclusive breastfeeding”? |

| Do you think that there are any benefits from EBF? |

Circle answers given and list others:

- Maternal-infant bonding
- Improved infant immunity
- Prevention of HIV transmission
- Optimal infant nutrition
- Decreased risk of infections
- Decreased maternal bleeding
- Child spacing
- Cost-effective

| Do you think that there are any disadvantages to EBF? |

List them
Circle answers given and list others:

Discomfort or nipple irritation
Time
Other people can’t help

26. A. How would you rate the health of your child overall?  
   Poor, average, good, excellent

27. *Are you accustomed to hearing talk about an illness called AIDS?  
   Yes, No

*How does a person avoid catching AIDS?

WRITE ALL THE RESPONSES MENTIONED

A. NOTHING
B. ABSTINENCE (DO NOT HAVE SEX)
C. USE A CONDOM
D. ONE WOMAN AND ONE MAN WHO ARE FAITHFUL TO EACH OTHER
E. LIMIT THE NUMBER OF PARTNERS YOU HAVE
F. AVOID ALL SEXUAL RELATIONS WITH PROSTITUTES
G. AVOID ALL SEXUAL RELATIONS WITH PEOPLE WHO HAVE SEVERAL PARTNERS
H. AVOID HOMOSEXUAL CONTACTS
I. AVOID SEX WITH PEOPLE WHO INJECT DRUGS
J. AVOID BLOOD TRANSFUSIONS
K. AVOID INJECTIONS
L. AVOID KISSING ON LIPS
M. AVOID MOSQUITO BITES
N. LOOK FOR PROTECTION AT THE HOUSE OF THE VOODOO PRIEST
O. DO NOT USE SOMEONE ELSE’S RAZOR
P. OTHER__________________
   - (WHAT)
X. OTHER__________________
   - (WHAT)

DO NOT KNOW

*KPC Questions
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<tr>
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</thead>
<tbody>
<tr>
<td><strong>28.</strong></td>
<td>Infants HIV status at 6 months</td>
<td>POS NR</td>
</tr>
<tr>
<td><strong>29.</strong></td>
<td>Infants HIV status at 12 months</td>
<td>POS NR</td>
</tr>
<tr>
<td><strong>30.</strong></td>
<td>Infants HIV status at 18 months</td>
<td>POS NR</td>
</tr>
<tr>
<td><strong>31.</strong></td>
<td>Did the mother receive Nevirapine at delivery?</td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>32.</strong></td>
<td>Did the infant receive Nevirapine at delivery?</td>
<td>Yes No</td>
</tr>
<tr>
<td><strong>33.</strong></td>
<td>Circle where the mother lives.</td>
<td>Urban Rural</td>
</tr>
</tbody>
</table>